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GOVERNMENT CONTROL OF RADIO COMMUNICATION

HEARINGS

BEFORE

**THE COMMITTEE ON THE
MERCHANT MARINE AND FISHERIES**

HOUSE OF REPRESENTATIVES

SIXTY-FIFTH CONGRESS

THIRD SESSION

ON

H. R. 13159

A BILL TO FURTHER REGULATE RADIO COMMUNICATION

PART 1

DECEMBER 12 AND 13, 1918



COMMITTEE ON THE MERCHANT MARINE AND FISHERIES.

HOUSE OF REPRESENTATIVES.

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RUFUS HARDY, Texas.

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GOVERNMENT CONTROL OF RADIO COMMUNICATION.

COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,
HOUSE OF REPRESENTATIVES,
Washington, D. C., December 12, 1918.

The committee met at 10 o'clock a. m., Hon. Rufus Hardy presiding.
The committee then proceeded to the consideration of the bill
H. R. 13159, which is here printed in full, as follows:

[H. R. 13159, Sixty-fifth Congress, second session.]

A BILL To further regulate radio communication.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That when used in this act—

The term "signals" means the signals used in communication by any electrical system or method without the aid of a wire or other conducting connections;

The term "radio station," means any place, vessel, or vehicle containing apparatus used, or capable of being used, for transmitting or receiving signals;

The term "experiment station" means a radio station actually used for conducting experiments for the development of the science of radio communication or the apparatus appertaining thereto, and used for no other purpose except as a technical and training school station;

The term "technical and training school station" means a station actually used for purposes of instruction in radio communication and of training operators, and used for no other purpose except as an experiment station;

The term "person" includes partnerships, corporations, and associations.

SEC. 2. That the President shall requisition and take permanent possession of, for the use of the Government, every radio station on land or on a permanently moored vessel, now in existence within the jurisdiction of the United States or any of its possessions, other than experiment stations, technical and training school stations, and stations belonging to the United States or the Government of the Philippine Islands.

SEC. 3. That no person shall maintain or operate, on land or on a permanently moored vessel, (first) within any State any radio station capable of being used, (a) for the transmission of signals, the effect of which extends beyond the jurisdiction of such State or causes interference with the transmission or receipt of signals to or from any place beyond the jurisdiction of such State, or (b) for the receipt of signals which originate outside such State, or (second) any radio station within any Territory, district, or possession of the United States. This section shall not apply to experiment stations and technical training school stations duly licensed, as provided by the act to regulate radio communication, approved August thirteenth, nineteen hundred and twelve, and stations belonging to the United States or the Government of the Philippine Islands. Whoever violates this section shall be punished by a fine of not more than \$600 for the first offense, and by a fine of not more than \$1,000 or imprisonment for not more than one year, or both, for each subsequent offense; and any radio apparatus operated in violation of this section shall be forfeited to the United States.

SEC. 4. That from the date of the passage of this act the Secretary of the Navy shall be charged with the execution of the provisions of the act approved July twenty-third, nineteen hundred and twelve, amending section one of an act entitled "An act to require apparatus and operators for radio communication on certain ocean steamers," approved June twenty-fourth, nineteen

hundred and ten, with the act entitled "An act to regulate radio communication," approved August thirteenth, nineteen hundred and twelve, and any amendments to the said acts, and the provisions of the International Radiotelegraphic Convention, signed in London in nineteen hundred and twelve and proclaimed by the President July eighth, nineteen hundred and thirteen, and future international radiotelegraphic conventions or treaties which may be ratified by the United States, except in so far as the provisions of the above-mentioned acts, conventions, or treaties apply to stations operated by other departments of the Government of the United States or by the government of the Philippine Islands.

SEC. 5. That the Secretary of the Navy may issue special licenses, subject to such conditions and restrictions, and for such periods, as he deems proper, for the establishment and operation of stations for special emergency use in cases where no other rapid means of communication are available. Any violation of such conditions and restrictions shall constitute cause for revocation of the license without compensation therefor, and the owners of such station shall be punished by a fine of not more than \$500 or by imprisonment for not more than one year, or both.

SEC. 6. That when the United States is at war or when war is threatened, or during any war in which the United States is a neutral nation, or during any national emergency, such fact being evidenced by the proclamation of the President—

(a) The President may issue regulations for the conduct and censorship of all radio stations and radio apparatus within the jurisdiction of the United States or of any of its possessions. Whoever knowingly violates any such regulation shall be punished by a fine of not more than \$10,000 or by imprisonment for not more than three years, or both, and in case of any violation the radio station or apparatus shall be forfeited to the United States; and

(b) The President may cause the closing of any radio station on land or on a permanently moored vessel within the jurisdiction of the United States or any of its possessions and the removal therefrom of any radio apparatus, or may authorize the use of the station or its apparatus by the United States.

The regulations for the conduct and censorship of radio stations, the closing of a radio station, and the removal of apparatus therefrom shall continue no longer than the duration of such war or emergency. The fact that the war or emergency has ended shall be evidenced by the proclamation of the President.

SEC. 7. That if, in the opinion of the Secretary of the Navy, the operation of any radio station would interfere with the receipt of signals by radio stations belonging to the United States or the government of the Philippine Islands, or by radio stations on shipboard, or would be otherwise prejudicial to the interests of the United States, no license under the act entitled "An act to regulate radio communication," approved August thirteenth, nineteen hundred and twelve, shall be issued to such station, and any such license already issued to such station shall be revoked or suspended for such time as the Secretary of the Navy may prescribe.

SEC. 8. That when any radio station is requisitioned, taken possession of temporarily or permanently, or closed, or its license revoked or suspended, the United States shall pay to the persons interested therein just compensation for the property or interest so taken, provided that a claim for such compensation is made on the Secretary of the Navy, within two years after the date of passage of this act. In case of disagreement as to such just compensation, the Secretary of the Navy shall make an offer, and if such offer is not accepted there shall immediately be paid to the person interested three-quarters of the amount offered. The person interested shall be entitled to sue the United States to recover the balance justly due, in the manner provided by section twenty-four, paragraph twenty, and section one hundred and forty-five of the Judicial Code. An amount sufficient to pay such just compensation is hereby permanently appropriated out of any money in the Treasury not otherwise appropriated.

SEC. 9. That all radio stations taken possession of by the President shall be operated under the direction of the Secretary of the Navy.

SEC. 10. That the Secretary of the Navy shall, so far as may be consistent with the transaction of Government business, open naval radio stations for general public business under regulations prescribed by him and shall fix rates for such service. He shall establish special rates for the handling of private dispatches by transoceanic or other special stations. The receipts from such services, less an amount not to exceed twenty-five per centum per annum expenses, shall be turned into the Treasury as miscellaneous receipts.

Mr. HARDY (presiding). Gentlemen, we have practically a quorum present, and unless there is some objection we will proceed with the hearing.

Mr. GREENE. I can see no objection, Mr. Chairman.

Mr. HARDY. I see Mr. Secretary Daniels is present. This bill is presented by the Navy Department, I believe, in a large measure. Mr. Secretary, will you direct the hearing in such order as you wish it, presenting your views in the manner you desire?

**STATEMENT OF HON. JOSEPHUS DANIELS, SECRETARY OF
THE NAVY.**

Secretary DANIELS. Mr. Chairman, this is a bill that would give the Navy Department the ownership, the exclusive ownership, of all wireless communication for commercial purposes. The history of wireless communication during this war has illustrated that there ought to be only one agency in control of wireless. This is not wrapped up with and has no connection with the question of Government ownership of public utilities, because wireless plants are apart from other means of communication and all other public utilities. It is the only method of communication which must be dominated by one power to prevent interference. That has been well demonstrated in this war, and it is true in time of peace, as well as in times of war.

I had a talk only a few days ago with Senator Knox, the former Secretary of State, speaking about the value of the wireless, and he said that when he was Secretary of State he felt the very great need then that the Government itself should own and operate all wireless communication, and he so recommended. I think that is true of all men who have been in either the Navy Department or the State Department.

The question of interference does not come in at all in the matter of cables or telegraphs, but only in wireless. We strongly believe that, having demonstrated in the war the excellent service and the necessity of unified ownership, we should not lose the advantage of it in peace, and while we are coming around, we hope and believe, to what will be a permanent peace, this Republic ought not to fail to be prepared to prevent communications from any country into this Republic which can not be controlled. Our experience at Sayville and Tuckerton, and with other wireless services owned in part or in whole by governments that were not at peace with us, or at harmony with us, is an illustration of the need. We ought to be able, through one agency of Government, to direct, to control, and to accelerate communication by radio.

I hope, Mr. Chairman, that what I now say will not be regarded as giving too much praise to the Navy. In saying this I do not give myself the praise, because we have an organization in the radio service that has fulfilled its purpose in so excellent a way as not only to win the commendation of our country but all the countries during this war. That service is so well prepared to undertake this work and to carry it on that I think we would lose very much by dissipating it and opening the use of radio communication again to rival companies.

The cessation of hostilities makes possible the publication of the remarkable story of the handling of radiotelegraphy by the Navy

during the period of the war. The public has been deeply interested in the story of the part played by the Navy in the transportation of our army of 2,000,000 men to Europe, and of the monumental achievement of laying a mine barrage cross the North Sea to bottle up the Hun submarines. The work of the Navy is not confined to the sea. Already the story of the huge mobile batteries manned by blue jackets has been told, and the part played by the heroic land forces of the Navy, the Marine Corps, is now part of the imperishable history of our country. At this time, then, it is very appropriate that the story of radiotelegraphy in the Navy be told. For a proper conception of the magnitude of the task and the perfection of the system evolved, it is necessary to realize how chaotic was the state of affairs at the beginning of the art.

When Marconi first began his epoch-making experiments with radiotelegraphy it was regarded by the public largely as a new curiosity. In certain quarters the true possibilities of the apparatus and the apparent erratic nature of the results prevented a true realization of its possibilities. The use of radio by the Russian and Japanese fleets in the Russo-Japanese war was its first application to the use which was eventually to overshadow all others. As the results accomplished became better known the danger from injudicious use was appreciated, and an international radiotelegraphic conference was held in Berlin in 1906 for the purpose of promulgating regulations regarding its use. The development of the art was so rapid that these regulations were found inadequate during the next few years, and a second international conference was held in London in 1912. The United States was represented at this convention by 13 delegates.

The sudden growth of radio and its spectacular and fascinating possibilities, led to various wildcat schemes, the most notorious being the United Wireless Co., whose failure caused the loss of thousands of dollars to investors in all parts of the country. The amateur radio operator had made his appearance also, and shortly before the London convention it was realized that laws for the control of radio in the United States were imperative. Accordingly, on June 24, 1910, an act was approved which rendered radio apparatus and operators compulsory on passenger vessels. This was supplemented by an act approved August 13, 1912, which provided for the licensing of all transmitting stations and imposed fines for violations of certain specific regulations. The Navy Department played an important part in the framing of this law. It was early realized that the importance of radio for controlling the movements of naval vessels in war time was of paramount interest to the country, hence provision was made for an executive proclamation in time of war, which would enable the proper use and supervision of radiotelegraphy in war time.

Mr. GREENE. What was the date of that proclamation?

Secretary DANIELS. April, 1917; in that month some time. It was soon after we entered the war. I am informed the first was April 6 and the second April 30. I will incorporate these two orders in the hearings so you will have them.

Even these regulations, however, were far too lenient. An evidence of this is the fact that a German company was able to remain

in control of the powerful station at Sayville, which was undoubtedly of the greatest value to Germany. This station broadcasted information as well as sending unneutral messages to the cruisers *Dresden* and *Karlsruhe*. To prevent repetition, it was necessary to station naval operators at this station with a naval officer as censor.

The loss of the *Titanic* and the publication of results obtained by amateur operators in intercepting messages concerning this disaster proved a tremendous stimulus to the amateurs, and such stations began to multiply rapidly. Even when such stations complied strictly with the law, it was found that a large amount of interference with naval and commercial work resulted, particularly in congested centers such as New York.

Immediately after the United States declared war against Germany the provisions of the law of 1912 were invoked, and an Executive proclamation was issued, closing all stations not necessary for naval communications and delegating the control of all other stations except Government to the Secretary of the Navy.

Under the provisions of this proclamation, the Navy took charge of practically all radiotelegraphy in the country, and notable advances in the art have been made, especially in long-distance work. I wish to emphasize that, because there is a very prevalent, but false, notion that when the Government is in control of important functions important developments are not made. The contrary is true. The elimination of interference by centralizing the control has been productive of the most excellent results. "Duplex telegraphy" has been possible to an extent never before contemplated. In compliance with the recommendation of an interallied radio commission, several "receiving centers" were established on the Atlantic coast, at points remote from high-power transmitting stations, and these were connected by wire with the main control station in Washington. At the present time the principal receiving stations are Belmar, N. J., and Otter Cliffs, near Bar Harbor, Me. These stations are connected with Washington by wire, messages being forwarded by wire as soon as received. From the control station the four high-power transmitting stations at Annapolis, Sayville, Tuckerton, and New Brunswick have been operated by distant control, it being possible for all to transmit simultaneously. Similar arrangements have been provided in Great Britain, France, and Italy, it being possible to maintain continuous communication with Carnarvon, Lyons, Nantes, and Rome, all stations transmitting and receiving continuously. It is frequently the case that a message is filed at Washington, transmitted by distant control from one of the high-power stations, and the acknowledgment received through Otter Cliffs within 10 minutes. In addition to receiving from allied stations, the receiving stations found it practicable to receive all messages sent on long waves from Nauen, including the dispatches to President Wilson regarding the armistice. Replies to these dispatches were made by radio direct to Nauen, addressed to the Swiss minister, as well as by cable.

Information was early received that the enemy was making extensive preparations for the cutting of cables for the purpose of interrupting communications with our forces in Europe. Three cables were actually interrupted, and excellent evidence is at hand that enemy influences were responsible. Fortunately this was the ex-

tent of the damage, and radiotelegraphy was not called upon to assume the whole burden of the cable traffic, often 200,000 words per day in each direction. However, a large amount of press and of routine official business was transmitted by radio, thus materially reducing the load on the cables. At no time was it necessary for the trans-Atlantic radio service to be worked to its full capacity.

Communication with the United States was matter of much concern to Gen. Pershing. At his urgent recommendation that the radio stations be prepared to take over the work of the cables, plans were made for the erection of the most powerful radio station in the world at Bordeaux, France, which will be known as the "Lafayette" station. The site, the transportation facilities in France, and the foundations for the towers were provided by France; the United States Navy assumed the designing of the station, the construction of the towers and apparatus, and the erection of the station. The power of the station will be 1,200 kilowatts. It is not yet completed, but when finished it will provide absolutely reliable trans-Atlantic communication at any season of the year.

In addition to the construction of this enormous station the Navy has found it possible to furnish the Cuban Government 18 steel towers for radio stations, and the necessary apparatus. Also three radio stations have been designed, constructed, and placed in operation for the Republic of Panama.

As soon as war was declared plans were made for the training of radio operators on a scale never before known. Preliminary schools were established in the various naval districts which served as feeders for the main schools at Harvard and Mare Island. The Harvard school has a capacity of nearly 4,000 students, men being graduated at present at the rate of about 180 per week. This large supply of operators made it possible for the Navy to supply radio operators to all trans-Atlantic merchant vessels, in addition to the large number of operators required for naval vessels and naval shore stations. In addition to operators the Navy supplied all merchant vessels with codes and with instructions for the use of radio in war time. In order to prevent any improper use of radio the radio apparatus on merchant vessels not supplied with naval operators was sealed while in port.

To obviate the necessity of a vessel at sea using her transmitting apparatus and thus disclosing her location, a broadcasting system was inaugurated, whereby messages to all vessels, naval and merchant, were transmitted "into the air" at certain designated times, all vessels being instructed to copy all those messages.

To provide for necessary communications between masters of merchant vessels and owners or agents, arrangements were made for certain naval shore stations to handle such messages when properly coded. Such messages were forbidden in the Atlantic north of Jupiter, Fla., when submarine operations commenced off our coast.

To assist in the enforcement of the regulations concerning the use of radio, 37 "intercepting stations" were established on the Atlantic coast, each of which forwarded to the Navy Department each day a complete record of all radio messages intercepted during the 24 hours. Those "logs" were carefully examined for evidence of transmission by merchant vessels which would enable a submarine

equipped with a radio compass to determine her location, as well as for evidence of enemy signals. In the case of violations by merchant vessels not provided with naval operators, an interview with the master was arranged at the next port of call, in order that the proper procedure might be explained to him. Certain merchant vessels were furnished naval "communication officers," in addition to the radio operators, to handle the coding and decoding of all messages.

A comprehensive system of radio compass stations was installed, and arrangements were made whereby those stations would work in pairs for locating suspicious or enemy stations. It was also arranged that the use of those stations in peace time for furnishing bearings to vessels at sea or to aircraft would be a part of their regular duties.

Radio telephones were perfected and installed on a large number of seaplanes, submarine chasers, etc., and have proven invaluable for such craft. Radio operators were also given a special course of instruction in the use of modern listening devices for the detection of the presence of submarines.

In cooperation with the Committee on Public Information a free press service to various foreign countries was instituted. This press service was copied in Central and South America and even in China, and was the means of combating the extensive wireless propaganda of Germany.

The operation of the Radio Service has proven so satisfactory that the purchase of all the shore radio stations of the Federal Telegraph Co. and the Marconi Wireless Telegraph Co. of America, except the four high-power stations of the latter, has recently been announced.

This at once increases the number of naval shore stations from 58 to 111; the Navy Department now owns all of the radio stations in the United States and its possessions formerly used for commercial radio traffic, with the exception of 16 privately owned commercial stations. Of these 16 stations 5 are low-power radio stations located in the Hawaiian Islands and used for intercommunication between the islands. Four of the remaining 11 stations are high-power stations erected and owned by the Marconi Co. One of these is located in California and one in Hawaii. Before the declaration of war by this country these two stations were used for handling messages between Hawaii and the United States and Japan. The two Marconi high-power radio stations located on the Atlantic coast have never been used for commercial traffic, and one of these stations has never been in operation at all.

This purchase means that the Marconi Co. has gone out of business of handling ship to shore radio messages, and this business has been turned over to the Navy Department, by whom it will be handled in future. The Navy will have the advantage of using not only its coast stations previously established, but also the Marconi stations now purchased, which are scattered along the coasts of the Atlantic and Pacific, Gulf of Mexico, and the Great Lakes, as well as the stations that the Navy Department recently purchased from the Federal Co.

The Navy has handled commercial radio traffic since 1912 with great success. Always equipped with the most modern apparatus, the ships and shore stations of the Navy have afforded the most reliable means of communication, and vessels of all nations have

made use of the service. Even during the war, with rigid restrictions regarding the use of radio in effect, thousands of dollars have been turned into the Treasury of the United States as receipts from the commercial radio traffic of the Navy. Since the commercial service of the Navy is not designed for profit, but for the purpose of keeping the operators always in training, it is possible to provide very low rates for the service.

One of the most profitable activities of the Navy during the war has been the study of the file copies of the radio messages handled by the Sayville and Tuckerton stations with German stations—Nauen and Eilvese—prior to April 7, 1917. In cooperation with the office of the Alien Property Custodian, millions of dollars worth of German-owned property was confiscated. One message alone enabled the Alien Property Custodian to seize \$10,000,000 worth of German-owned ships, and another message enabled that officer to secure for the Navy Department the high-power station at Sayville. Another interesting fact concerning these stations is that a large sum of money, representing the receipts of these stations while under Navy supervision prior to April 7, 1917, was invested in liberty bonds, despite the protest of the German agent, now located in an internment camp.

Although the science of radio communication has continued to advance, the great increase, present and prospective, in the number of vessels on our coasts and the consequent increase in radio communication on many different wave lengths, continues to demonstrate the necessity for unified control under the Navy Department of all radio communication to prevent interference. The recent purchase will go very far toward accomplishing this end so far as ship to shore communication is concerned.

It was at one time suggested that if the Navy Department took over handling of commercial radio communication it would not be in a position to provide operators or proper inspection and repair of sets aboard ship to maintain commercial service. But, as stated above, since the outbreak of the war the Navy Department has established large radio schools and has turned out from these schools several thousand operators who are now manning not only all of the regular naval vessels and vessels temporarily in the naval service, but are also manning almost all other vessels flying the American flag, except some engaged in the coast trade. The department has also established at various ports repairs bases, at which radio sets on board merchant ships, as well as naval vessels, can be regularly inspected and kept in order until such time as the ship owners provide facilities for carrying on this work. The Navy is, therefore, thoroughly prepared to handle every phase of the commercial radio traffic between ship and shore which it has now taken over.

In addition to the above, there is at present a bill before Congress (H. R. 13159) providing for the permanent Government ownership of all commercial shore radio stations, the control of the stations to be delegated to the Secretary of the Navy. Provision is made in this bill for experimental stations and amateur stations, and the inspection and licensing of such stations, formerly under the supervision of the Department of Commerce, is delegated to the Secretary of the Navy. As the Navy already owns all but 16 of the commercial shore stations, the passage of this bill will secure for

all time to the Navy Department the control of radio in the United States, and will enable the Navy to continue the splendid work it has carried on during the war.

Mr. Chairman, Capt. Todd, the director of communication, is here with me—

Mr. GREENE. I would like to ask the Secretary a question or two.

Mr. HARDY. Have you finished with your preliminary statement? Secretary DANIELS. I have finished that; yes.

Mr. GREENE. Mr. Secretary, I understood you at the opening of your remarks to say that this was not intended to be the establishment of Government ownership. It seems that your statement—undoubtedly prepared, of course, by a gentleman who has been acquainted with newspaper work—discloses from beginning to end, over and over, Government ownership, Government control—

Mr. EDMONDS (interposing). Government monopoly.

Mr. GREENE. Government monopoly, contrary to any control that we hoped for years to establish under the Sherman antitrust law. This becomes an immense trust, and it also becomes, according to my view of it, the establishment of the Department of the Navy in the commercial business.

There are a number of gentlemen here that have had some experience in radio communication. I never have heard before that it was necessary for one person to own all the air in order to breathe; we all breathe more or less. And I believe that radio business has been and can be carried on without Government monopoly. We all admit that during the war it is a very proper thing to have absolute control, but now in times of piping peace, it seems to me there is a great opportunity to obtain advancement in the radio service even outside of the Navy Department. I do not think all the wisdom is contained there; it has not been heretofore, and I do not think it is all contained there now.

So I think there ought to be careful consideration of a proposition as broad as this bill is. This is absolute Government control, and it is almost a test as to whether this Government is to enter upon Government control. I must say that I must protest against what the Secretary has said about this not being a proposition for Government control.

Mr. HARDY. I think you misunderstand the Secretary, Mr. Greene. He said it was not connected with the Government control of public utilities.

Mr. GREENE. Well, this radio is a public utility of the highest kind.

Mr. HARDY. There is not any question as to the position of the Secretary with reference to this particular proposition.

Mr. GREENE. And if it is to be controlled for commercial purposes, it should be controlled by the Department of Commerce rather than by the Department of the Navy. In time of war I would permit the Navy Department to have everything they need, and they have had it, and they have had all the advantage of the number of men who have enlisted in the Navy for the purpose of extending the radio service. I know of men in my own city who were pronounced amateurs; yet they have some brains, and they have improved their brains and have improved their apparatus.

Mr. HUMPHREYS. Mr. Chairman, why would it not be a good idea to hear the evidence before we submit the argument to the jury.

Mr. EDMONDS. I would like to ask the Secretary a few questions.

Secretary DANIELS. Will you permit me to say a few words first? My preliminary statement was misunderstood, my distinguished friend—

Mr. GREENE (interposing). Well, that is what you said.

Secretary DANIELS. I think if you will look at the notes you will see that I said—

Mr. GREENE (interposing). But corrections will be made in the notes.

Secretary DANIELS. No; as I said it. I do not think I made myself quite clear. I said I hoped this bill would not be confounded with any general proposition for Government ownership of public utilities, because that was a question that might well be debated and ought not to be settled hastily as to the great public utilities which can operate without interference; but the radio stood separate and apart from anything else in that the air is the medium through which the communication is carried on and that can not be controlled, and interferences may be had, and the only safe thing about radio communication is that only one concern should control and own it.

Now, I beg to say that I do not claim for the Navy, although we admit freely the excellent—

Mr. GREENE (interposing). Oh, I am not saying anything against their excellence at all, against what they have accomplished.

Secretary DANIELS. I did not claim for the Navy that it had made through its officers, expert as they are, all of the great discoveries in radio. Our purpose all through has been to cooperate most cordially and to secure the advantage of all the inventions and ideas of men in civil life.

Mr. HARDY. Will you permit me just to make this statement? Judge Alexander had arranged to let those who offered this bill be heard at this time, and for those who opposed it to be heard commencing next Tuesday. He being sick, it is my desire to carry out that part of the program.

In the meantime, to shorten matters, I suggest that instead of discussing the merits of the bill, as members of the committee we simply ask questions for information as the witnesses come before us, and not attempt to discuss the merits of the bill, which we will do in executive session.

Mr. EDMONDS. That is what I was going to suggest.

Mr. HARDY. What we want now is the facts.

Mr. LEHLBACH. Mr. Secretary, you have referred several times to obviating interferences. Will you not be good enough to inform us, or inform me—I suppose other members of the committee understand it—just the character of the interferences that are to be obviated, the nature of them, and what they are due to?

Secretary DANIELS. I will ask Capt. Todd, who is the Director of Naval Communications, to answer that question, because he is an expert in that subject.

Mr. EDMONDS. Mr. Lehlbach, will you not let Capt. Todd answer that question in his statement?

Mr. LEHLBACH. Very well.

Mr. EDMONDS. I would like to ask you this, Mr. Secretary: Has the department made any estimate of what the cost of this would be?

Secretary DANIELS. Yes; the cost of this would be somewhere in the neighborhood of \$5,000,000.

Mr. EDMONDS. How about patents and the patent rights.

Secretary DANIELS. Well, of course, if any man has a patent or a patent right, the court would determine his rights, but whatever determination the courts might make the Government would pay such royalties as were just and fair to the owners of the patent rights.

Mr. EDMONDS. You have no idea at all what that would be?

Secretary DANIELS. Of course, I can not foretell what the courts would do.

Mr. EDMONDS. But you have a kind of idea that it is going to be a pretty high price, have you not?

Secretary DANIELS. I do not think it will be a very high price.

Mr. EDMONDS. Do you think the Government would be able arbitrarily to settle the cost of those patent rights?

Secretary DANIELS. Arbitrarily?

Mr. EDMONDS. Yes.

Secretary DANIELS. Oh, I think the courts would settle them.

Mr. EDMONDS. The last hearing we had on this measure did not indicate that that would be settled very satisfactorily. Men came here that had patents and they did not seem to be able to get any satisfaction out of the department at all, if I remember correctly.

Secretary DANIELS. Of course, there are various conflicting claims about patent rights. Under this bill no man would lose any right he had of getting such royalty as would be fair.

Mr. EDMONDS. I believe you made the statement that you purchased the Poulsen-De Forest Co. Is that the name of the company?

Capt. TODD. The Federal and Marconi stations.

Mr. EDMONDS. Is not that the De Forest system, too,

Capt. TODD. You are speaking about the Poulsen system?

Mr. EDMONDS. Is not that the Federal system?

Capt. TODD. That is the Federal system.

Secretary DANIELS. We own that; we own everything they claim.

Mr. EDMONDS. You bought everything they claimed?

Secretary DANIELS. And everything they have.

Mr. EDMONDS. Did they want to sell it to you or did you take it?

Secretary DANIELS. We made a contract with them and paid them, and it was very satisfactory.

Mr. EDMONDS. You made the proposition to them? They did not ask you to buy?

Secretary DANIELS. I do not recollect who made the first proposal, but it was certainly satisfactory.

Mr. EDMONDS. As I understood you, it was something over \$1,000,000 you paid for that system?

Secretary DANIELS. Yes; a million and a half.

Mr. LEHLBACH. \$1,600,000.

Secretary DANIELS. \$1,600,000. That included nine stations.

Mr. EDMONDS. When was this purchase consummated?

Secretary DANIELS. About six or seven months ago.

Mr. EDMONDS. Then the Marconi system—you purchased their stations?

Secretary DANIELS. Their shore stations.

Mr. EDMONDS. And when was that consummated?

Secretary DANIELS. Within the last few weeks.

Mr. EDMONDS. Since the armistice was declared?

Secretary DANIELS. It had been under consideration—I think the agreement was made in October.

Commander HOOPER. It was started by the Shipping Board's request to purchase the sets on their ships.

Secretary DANIELS. I wish, Commander Hooper, that while you are speaking you make a statement to the committee about the request of the Shipping Board and the necessity for our doing it.

Mr. EDMONDS. I think that we had better defer that until you make your regular statement.

Why did you buy these different systems?

Secretary DANIELS. As to this one, because we were buying them, I think, at \$1,000 a piece.

Commander HOOPER. We had to get the sets for the Shipping Board, and in order to get them Marconi would not sell unless they sold their shore stations. We wanted the shore stations as part of our system, so there would not be mutual interference, so we finally decided to make one deal out of the whole thing and buy the ship sets and the coastal stations and then afterwards be reimbursed by the Shipping Board.

Secretary DANIELS. And we needed the shore stations. We have so many ships—I do not know the number of merchant ships we have, but the Navy is manning and furnishing officers for and controlling all the ships that take trips to Europe and bring them back and all the other ships that are doing Army service, and then we furnish these sets to all the Shipping Board ships.

Mr. EDMONDS. What I am trying to get at is this: You had no lack of power during the war to take over these stations and to utilize them in any way you saw fit? Is not that true?

Secretary DANIELS. We had the power; yes.

Mr. EDMONDS. And then you exercised that power, you exercised it gradually, and then you exercised it finally by taking over every station and handling the entire wireless business of the country?

Secretary DANIELS. That is right.

Mr. EDMONDS. And up to the present time and at the present time you still have that power and can exercise it?

Secretary DANIELS. We have.

Mr. EDMOND. And yet, at the same time, after this committee refused to bring out a bill to purchase wireless apparatus, you utilized the Government's money to purchase this wireless apparatus and took over the commercial systems without the consent of Congress?

Secretary DANIELS. Not at all. We did not act in defiance of Congress, because Congress had not done this. We did it because it was a good business proposition and because we had the funds appropriated by the Naval Committee to make the naval communication service more effective.

Mr. HUMPHREYS. You mean, appropriated by Congress?

Secretary DANIELS. Appropriated by Congress.

Mr. HUMPHREYS. You said, by the Naval Committee.

Secretary DANIELS. I mean, through the naval bill.

Mr. EDMONDS. Yes, but Congress did not have any intention to put you into commercial ownership of radio communication at that time. You did not explain it to the Naval Committee that way.

Secretary DANIELS. We explained to the Naval Committee that this money we desired was for use in perfecting the radio service.

Mr. EDMONDS. Well, I have talked to members of the Naval Committee, and they had no impression at all that you were going to utilize the money for the purchase of radio systems and putting the Government into a commercial business.

Secretary DANIELS. We are compelled to have this for naval business, and as the Navy Department was put in charge of the merchant ships it was a splendid business proposition, and it never occurred to me that I was not following the intent and will of Congress in making this system more efficient.

Mr. HARDY. It seems to me, Mr. Edmonds, that you are indulging in argument.

Mr. EDMONDS. I only want the Secretary to tell me his reasons for handling this business in this way. If there is a good reason for the Government entering into this business the committee ought to know it.

Secretary DANIELS. There is an act of Congress specifically giving us the authority to handle commercial business.

Mr. EDMONDS. I know you have that act; you had it before the war.

Secretary DANIELS. Oh, yes.

Mr. EDMONDS. If during the war there was anything developed that made it necessary for the Navy Department to purchase these systems, then I would say that you did perfectly right. But in my view, opposing Government monopoly as I do, I do not think that a question of policy like this ought to have been decided by the department; it ought to have been decided by Congress.

Secretary DANIELS. I think we had perfect authority; if I had not I certainly should not have exercised it.

Mr. GREENE. Was this authority a general authority, or was it not specific?

Secretary DANIELS. It was general authority.

Commander HOOPER. Mr. Secretary, I can bring out one point there. The Shipping Board at the beginning of the war asked us to provide the radio sets for their ships, as a logical thing to do, and we did it, with everybody in agreement. But there were large numbers of ships and large numbers of sets to be provided, and it was a great job to get it started. It took the fine cooperation of every radio manufacturer with the Navy Department to do the job. It took us, then pretty nearly as long to get a radio set as to build a ship.

As time went on we furnished radio sets and operators to large numbers of ships of the Shipping Board—to the majority of their ships. They found that our system of doing business was very satisfactory to them and that the rental system which they had for the ships that they had requisitioned—on which ships the Marconi and other companies were charging them very high rentals for the apparatus and operators—was very unsatisfactory, and they were losing money by it. So they asked us to make a clean job of it, to buy all the rest of the sets that we did not own on the Shipping Board ships. It amounted to some 275 ships.

We undertook to negotiate with the Marconi Co. for the purchase of those remaining Shipping Board sets and they objected to selling. It was a matter of considerable profit to them, and naturally they objected to selling them. They said, however, that if we did buy them we ought to buy their coastal stations, because their coastal stations would not do them any good if they did not own the ship sets, which was perfectly true. Otherwise, they would charge us for those Shipping Board ship sets enough to make up for having to throw these coastal stations away. So rather than pay double for the price of the radio sets on these ships that the Shipping Board wanted us to buy, so as to save the Shipping Board all this big rental, we said we might as well have the coastal stations if the Marconi Co. did not want them and they were so valuable to us. So they threw them in.

Mr. EDMONDS. You approached the Marconi Co. first, did you not?

Commander HOOPER. Yes, sir; absolutely.

Mr. EDMONDS. The Marconi Co. did not fall all over themselves to sell you these?

Commander HOOPER. No, sir; they objected to selling them. They did not want to sell them at first. But we made a good deal, and I think they are very well satisfied and everybody is well off.

Mr. EDMONDS. Mr. Secretary, you did not state the price you paid for the Marconi system?

Secretary DANIELS. We paid \$1,400,000.

Commander HOOPER. \$1,450,000.

Secretary DANIELS. For stations and sets.

Mr. EDMONDS. That does not include the vessel sets?

Secretary DANIELS. It includes everything except the high-power stations.

Mr. HADLEY. Mr. Edmonds, may I ask a question, as a part of your interrogation?

Mr. EDMONDS. Yes; certainly.

Mr. HADLEY. I would like to ask the Secretary at this point what is the specific item in the naval appropriation bill which carries the fund for that payment?

Secretary DANIELS. I have forgotten the title of it. It is in the appropriation under the Bureau of Steam Engineering, which has direction and control of all radio matters. Under that appropriation we buy a tower and under that appropriation we put in radio stations, wherever the Chief of Operations of the Navy and the General Board feel that we ought to have them.

Mr. HADLEY. Was the estimate on the item itemized when it was before the Naval Committee?

Secretary DANIELS. I think it was not. I do not think it has ever been itemized in the radio matters at all; it has always been a general lump appropriation.

Mr. WHITE. How much was the lump appropriation?

Secretary DANIELS. Under the Bureau of Steam Engineering?

Mr. WHITE. Yes.

Secretary DANIELS. It was many millions of dollars. I can get the exact figures for you, if you desire.

Mr. LEHLBACH. The total amount expended on those purchases was about \$3,000,000—about \$1,400,000 for the Marconi companies, and about \$1,600,000 for the Federal company.

Mr. EDMONDS. I do not want Secretary Daniels to think that I do not appreciate the work of the Navy during the war, because I think that every Member of Congress thinks that the work of the Navy was handled very well and very satisfactorily.

Secretary DANIELS. I understand.

Mr. EDMONDS. The only question I am raising here is this: That the Navy Department, through this action, has embarked us on a project that should have the authority of Congress before it is undertaken. I do not question the Secretary's right to embark on whatever purchases were necessary; but I question his authority to embark us on a new and broad policy; and I am trying to find out why, in time of peace—

Secretary DANIELS (interposing). Well, we did not buy those properties in time of peace.

Mr. EDMONDS. Wait a minute, please, until I finish my thought; you had plenty of authority to take these sets, stations, and companies, and to handle them absolutely as you pleased, during time of war. But then you turn around and purchase these companies, perhaps embarking the country into a commercial policy, and a policy which should be decided upon in Congress before it is undertaken.

Secretary DANIELS. It is a policy which Congress had already decided upon many years before the war, giving us authority and direction. And it was a good business proposition, too, by these two companies for war and for peace. If I had thought that I had not full authority, I would not have done so.

Mr. GREENE. I understand that you thought you had the right.

Mr. EDMONDS. Yes, I understand that you thought that; and, so far as the spending of the money is concerned, I am not questioning that at all. The question is one of policy entirely, whether we ought to embark into the owning and operation of the entire commercial business or not. That is the question in my mind.

Secretary DANIELS. That is a matter for you gentlemen to settle for the future. I am strongly of the opinion that Congress, having authorized the Navy Department, some dozen years or more ago, to do commercial business; and Congress having established the Shipping Board; and Congress having appropriated many millions of dollars to build ships, it would have been most uneconomical not to have responded to the request of the Shipping Board, when we were authorized by law to do so, and had the money appropriated under a general fund to strengthen the radio service.

Mr. EDMONDS. But you must recollect that the operation of ships by the Shipping Board is limited to a certain term of years; whereas, you are tying a permanent policy on the Government of having a monopoly of the radio business. Now, that is a question that I think we ought to have decided and that ought not to have been decided in the department, since you had full and ample power and authority to take every one of those stations and do as you pleased with them during the time of war. At the same time, you have just bought enough radio properties to force the Government into a new line of work and into a new policy that Congress ought to have decided.

Secretary DANIELS. Perhaps so, if you proceed on the theory that the war is over; but the war does not end until the Senate ratifies the treaty of peace.

Mr. EDMONDS. After reading the Post this morning I thought we had a new war on our hands. [Laughter.]

Commander HOOPER. May I say a word at this point. Mr. Secretary?

The SECRETARY. Yes; certainly.

Commander HOOPER. If we had not purchased those sets for the Shipping Board we would have had to pay \$1,000 a year on the apparatus for those remaining ships; and as they intend to be in business, I understand, for about five years—or at least that seems to be the general opinion—that would have made \$5,000 a set that we would have had to pay as rental.

Mr. EDMONDS. Is that with an operator or without an operator?

Commander HOOPER. They have to pay extra for the operator; the operator is paid for in addition.

Now, those sets cost only about half of that amount. So it was a very good business proposition for the Shipping Board for us to buy those sets; and they asked us to buy them; and we had to take the shore stations in order to get them; and we are saving money for the Government by taking the whole business; and we would have been foolish not to have them throw the shore stations in if the Marconi Co. did not want them.

Mr. HARDY. As I understand, you mean that if you were only using them temporarily you would still be effecting an economy by purchasing them with the shore stations?

Commander HOOPER. That is it exactly; that is the whole thing; we would have had to pay too high a rental.

Mr. HUMPHREYS. How much rental would you have had to pay?

Commander HOOPER. \$1,000 a year for those sets.

Mr. HUMPHREYS. And how much did you pay—

Commander HOOPER. Well, we paid for the apparatus \$1,200 for some sets and \$2,500 for others.

Mr. EDMONDS. The companies kept them in repair on the ships, did they not?

Commander HOOPER. Yes; but that did not over \$50 a year.

Mr. EDMONDS. That would depend on the age of the material, would it not, just like it would cost more to keep an old automobile in repair?

Commander HOOPER. Well, we counted on an average of \$75 a year, putting it at the top figure.

Mr. EDMONDS. Does that include the overhead expenses, or just the cost of the actual physical repairs?

Commander HOOPER. That is, as we estimate a fair price for everything. And Mr. Marconi told me that his average price was about \$50 a year. Our relations have been very cordial and agreeable on the whole matter; there is no diversity of opinion between the Marconi Co., who made this deal, and the department as to the propriety of this deal. They did not want to keep the coastal stations, I believe, because they saw there would be no business for them; and it was a good business deal for them to sell just as it was a good business deal for the Government to buy them and save the Shipping Board all of that money.

But the interest of those companies in fighting this bill is not on account of those coastal stations that you gentlemen are asking

about. The opponents of this bill are fighting it on the high-power stations, which we have not bought; and that is the question that all of the arguments are coming up about; the matter of the coastal stations is something that they are satisfied with, and the Navy Department is satisfied with.

Mr. EDMONDS. Would they not sell you those sets without the coastal stations?

Commander HOOPER. No; that is the reason we had to buy them.

Mr. EDMONDS. Well, were you not buying sets on ships?

Commander HOOPER. We were buying sets of our own, but the Marconi Co. had contracted with those shipowners of the ships that were requisitioned by the Shipping Board, which bound them to keep the sets that the Marconi Co. owned, and to pay that rental of \$1,000 a year; and they wanted to get rid of that, so as to get it on the same basis as all the rest of the Shipping Board's ships.

Mr. EDMONDS. I do not suppose that any committee of Congress appreciates any more than this one the kindness of the Navy Department in endeavoring to save the Shipping Board a few cents—certainly somebody ought to be able to do that for them. [Laughter.]

Commander HOOPER. Yes. Well, I think we handled all of that business well, and I think the Shipping Board handled that business well; we saved them money; they wanted us to handle it all for them; and we made a good deal which nobody in the radio world objects to; we got what we wanted; the Shipping Board got what they wanted; and the Government made money on the whole business.

Mr. EDMONDS. Well, I suppose that the Shipping Board has spent that money that you saved by this time. [Laughter.]

Mr. WHITE. What did those sales include? Did they include any patent rights, or just the physical properties?

Commander HOOPER. They include the patent rights on the apparatus that we purchased—absolutely, clearly, and for all time. But not for any other apparatus except what we purchased; but as to the apparatus we purchased it is specifically stated in the contract that the patent rights are clear.

Mr. WHITE. But these companies from which you have purchased do not own all of the patent rights; and there are other patent rights, then, which the Government has not acquired?

Commander HOOPER. I can answer that in a different way, if the Secretary wishes me to go into that.

Secretary DANIELS. I would like to have you do so, Commander Hooper.

Commander HOOPER. Shall I speak about the board that you have appointed to go into the patent question, Mr. Secretary?

Secretary DANIELS. Yes; I would like for you to give all the information you can, because I think the committee ought to know all that we have done, or have contemplated.

Commander HOOPER. The radio patent system is the most complicated thing in the world. If any one of us tried to straighten it out, I do not know what would happen to us; and I think all the radio people have about come to the conclusion that the only thing to do is for somebody to take hold of it and try to do fairly by everybody, and that they would all profit by it. The reason the patent situation

as to radio systems is in such a state is due to the patent laws of the country, and not to the neglect of anybody. And, of course, that is a matter that I can not discuss now.

But patents were granted to everybody in radio who applied for them in the beginning, because the Patent Office had no experts to tell whether a radio patent was good or not; and it is pretty hard to tell, even now, which ones are good; and the courts have adjudicated some patents, and others that may be of great worth have not been adjudicated.

When the war came on the whole patent situation was in such a mess that if we had not gone on and taken the bull by the horns, we would not have been able to buy any radio sets, because everybody would have been arguing about patent rights all the time, and about infringement.

I happened to be in the bureau at that time—I went to sea afterwards—and while in the bureau I got the radio manufacturers to agree—they were very patriotic and wanted to help in every way—to call all the patent rights off until after the war, and then we could settle those questions.

Mr. WHITE. In that connection, is it not true, as a matter of fact, that one of these processes, which was subject to patent or which has been patented, was the most valuable part of the whole radio outfit?

Commander HOOPER. If you will let me answer that in my own way I shall be glad, as I want to bring out the general policy first.

Mr. WHITE. But right in that connection I want to ask another question, so that you can discuss this at the same time: If you have taken over the physical properties, and have not taken over the patents of these companies, and you forbid these companies to engage in the radio business, have you not left them with extremely valuable rights, or what might have been extremely valuable rights, which they can not utilize at all? Will you please answer with that question in mind?

Commander HOOPER. Yes. I want to explain to the committee, so that they can be proud of what we have done in the war, and not feel that we have done the wrong thing; because we are proud of what we have done ourselves, and I am sure the gentlemen, both those for and those against us, will be pleased with the way we are trying to do it.

As I stated before, we said that we would call it all off until after the war. Well, that may have been a good thing or a bad thing; but at least we have got results, and we would not have got results in any other way. Now that the war is over, and it is our duty to pay the bill—

Mr. GREENE (interposing). Well, that does not agree with what the Secretary said—about the war being over. [Laughter.]

Commander HOOPER. The war, so far as getting radio apparatus in a hurry is concerned, is over. And we have got to pay the bill.

So, there has been a board appointed—it was appointed a few months ago, and consists of a representative of the Department of Justice and representatives of the War Department and the Navy Department; and the idea is—

Mr. EDMONDS (interposing). Excuse me for interrupting, but how long has that board been in existence?

Commander HOOPER. It has been in existence several months; I have myself recently returned to the bureau from sea duty.

Mr. EDMUNDS. Has that board done anything yet?

Commander HOOPER. Well, the war was on, and we could not do very much while the war was on, because we had not the time; we had to keep fighting for our existence. It has been a serious proposition, keeping up with the game.

And when I came back to the bureau, I was put on this board as a substitute for the officer that had previously been appointed. And I said, "Well, the thing to do is to wait until the armistice is signed, and then will come the time to pay the bill; there is no use stopping our war work," as we had to win the war then, and that was a very serious thing. And everybody seemed to be agreeable to that course; there was no particular objection to it.

And now, we have taken active steps, or this board has, to proceed with this work of settling up the patent situation. An officer has been assigned, subject to the Bureau of Steam Engineering, to handle that patent work; and two other experts have been put on with him; and I will prophesy that in six months half of the work of the Radio Division of the Bureau of Steam Engineering will be in getting this patent business straightened out. We are getting up all the data now, as to what apparatus we bought, and who has the right to the patent, and all that sort of thing; and we will see what it all amounts to. The only way to do it, in my opinion—I do not know whether the Secretary will agree with me, because it may not be the proper thing to do—is to give each man a percentage on what apparatus we bought under the patent.

And I am sure that the idea of the board is, in a broad-minded way, to try to see that everybody gets what is coming to him—and I am afraid that they will all get a little more than is coming to them; but that is natural, and may not be a bad thing, broadly speaking, for the Government to pay liberally to the men that have done things, especially in a field like radio work, which needs every encouragement that we can give it.

Now, I have spoken a little longer, perhaps, than the Secretary would have had had me speak, but I wanted to bring out these points, and show wherein the radio inventors have helped us very much, and to state that we intend to do our part now toward them.

Mr. HARDY. I would like to suggest, gentleman, that the Secretary has these representatives of the department with him; and when he gets through we can have these men make any necessary detailed explanation.

Secretary DANIELS. Mr. Chairman, I was very glad to have Capt. Todd and Commander Hooper go into what we may call these technical and detailed explanations, because they are more familiar with that than I am; I am not an expert wireless man.

Mr. SAUNDERS. If Mr. Edmonds is through, I would like to ask the Secretary something about the scope and purpose of this act.

Mr. EDMONDS. I am through for the present.

Mr. SAUNDERS. I understood you to say, Mr. Secretary, that this is not a proposition of Government control and ownership, except over this particular subject matter.

Secretary DANIELS. Over this particular subject matter, because this is different from everything else.

Mr. SAUNDERS. And in that connection you undertook to justify the Government going into the exclusive commercial business, by reason of the peculiar character of what you call the subject matter?

Secretary DANIELS. Yes.

Mr. GREENE. And also the profits; I would like to ask that—the profits.

Mr. SAUNDERS. As I understand it, this bill is the same bill you had before the committee heretofore?

Secretary DANIELS. I think it is an entirely new bill.

Mr. SAUNDERS. I do not mean with respect to the framing of it; but is not the subject matter of it the same, and are not the purposes that you seek to carry out by this bill practically the same as those you sought to effect by the bill that was before this committee once before?

Secretary DANIELS. The same principle.

Mr. SAUNDERS. This, as I understand it, is a commercial proposition; there is no lack of laws for the protection of the country during war—outside of the legislation that we enacted at the beginning of the war, the laws generally give the Navy, for the purpose of the protection of the country, ample control of the radio situation, do they not?

Secretary DANIELS. In time of war; yes.

Mr. SAUNDERS. Yes. You do not need anything then, under this or any other bill, for the purpose of public protection in time of war?

Secretary DANIELS. In time of war, no; we, of course, need those powers in preparation for war.

Mr. SAUNDERS. Yes; in preparation for war; I say, in connection with war, broadly speaking.

Secretary DANIELS. In connection with war.

Mr. SAUNDERS. So that what is sought to be accomplished by this bill is to see that the interests of the country, commercially speaking, would be advanced by this measure.

Secretary DANIELS. Well, when you use the term “commercially speaking,” I would like to qualify that. It is for the use of the country, commercially speaking; but it is largely for the use of the ships—naval and merchant marine.

Mr. SAUNDERS. Well, on the commercial side, because you have just indicated that for the purposes of national protection you do not need any legislation.

Secretary DANIELS. Not during war.

Mr. SAUNDERS. Yes; not during the war. Now, as I gather from looking over this bill, should we pass this bill the average citizen of the country, in the pursuit of his business, would be inhibited from establishing a plant of his own?

Secretary DANIELS. He could establish a plant and make apparatus which we could purchase if we could use it.

Mr. SAUNDERS. But he could not make it for the purposes of his own business, could he?

Secretary DANIELS. He could not be in competition and have a wireless operating, with all the interference that that would cause, which would largely negative the value of wireless as a means of communication.

Mr. SAUNDERS. Well, that brings up the question of interference, which is quite another and distinct principle. I understand you,

in your statement, to refer to a number of small plants—I presume they were small—and you mentioned the fact that the Wanamaker concern was operating one for its own purposes.

Secretary DANIELS. Yes.

Mr. SAUNDERS. And I can conceive very well that, in the development of the country, many other concerns might desire to have their own private wireless system like the Wanamaker concern is using, just like they have their own private telegraph or telephone systems. That would not be possible, as I understand it, if we should enact this bill?

Secretary DANIELS. They ought to be all under one domination, ownership, and control.

Mr. SAUNDERS. I am not raising the question of what they ought to be; they will be.

Secretary DANIELS. I might say that this bill carries with it the authority to issue a special license, which might be given wherever the needs of the public would require it.

Mr. SAUNDERS. I have not found such a provision in the bill; what section of the bill is it that you refer to which will authorize licenses to be issued which will allow those private commercial enterprises to have wireless plants?

Mr. EDMONDS. It is in section 4.

Mr. SAUNDERS. Is that what you refer to as giving that authority—section 5?

Secretary DANIELS. Section 5, on page 4, which reads:

That the Secretary of the Navy may issue special licenses, subject to such conditions and restrictions and for such periods as he deems proper, for the establishment and operation of stations for special emergency use—

Mr. SAUNDERS. Yes; for “special emergency.” Now, that does not contemplate a general commercial condition, of course.

Now, it says, “In cases where no other rapid means of communication are available”; that makes it more unlikely, therefore, that the man will be unable to get any special permit. I will take an illustration of this sort, a natural one: In the South there are a number of large cotton mills that are under one ownership; they are established in different parts of a State, or in several States. Those concerns might very naturally, for the same reason that caused Wanamaker to establish his private plant, want to have a special wireless system for their own use. Now, the possibility of that would be eliminated under this bill, would it not?

Secretary DANIELS. No; we could give them a license, if they would not interfere with our stations.

Mr. SAUNDERS. Well, you would hardly be able to call that “special emergency use in cases where no other rapid means of communication are available.”

Secretary DANIELS. Well, you might change the language of the bill, Mr. Saunders, and you might meet that objection by saying, “For the establishment and operation of such stations,” and strike out “for special emergency use.” I would not have any objection to that.

Mr. SCOTT. You would also have to strike out the words “where no other rapid means of communication are available.”

Secretary DANIELS. We could strike out all after the word “stations.”

Mr. SAUNDERS. Well, that would at once very materially change the scope of the bill because, in the commercial world of the United States, there might be a very great number of privately-owned stations.

Secretary DANIELS. Well, not any more than you have in the case of telephones or telegraphs. A man might put in his own private telegraph, but he does not, because, under this bill, it would be operated so well, and he would have such good facilities that, except in exceptional cases, there would be no inducement for them to do that.

Mr. SAUNDERS. Well, should not that be left to the man himself, so that if he wants to he may establish one?

Secretary DANIELS. If it does not interfere, these special licenses would be granted.

Mr. SAUNDERS. What do you mean by "if it does not interfere?" Do you mean interfere with the operation of the general system?

Secretary DANIELS. With the operation of the general system.

Mr. SAUNDERS. That is a matter of regulation, is it not, with respect to the wave lengths to be used?

The CHAIRMAN. Yes; that is a matter of regulation.

Mr. SAUNDERS. Well, I will ask you, in that connection, then, would it be possible, with a proper system of regulation as to the wave lengths to be used, and the time that these stations could be operated, to have a broad, general system of privately owned and privately used wireless apparatus in the United States?

Secretary DANIELS. I think, Mr. Saunders, that we ought to have it absolutely, except in special cases, governmental owned and governmental operated.

Mr. SAUNDERS. Well, that comes back to what I said before, then.

Secretary DANIELS. There ought to be power to license, when such license does not interfere with the larger purposes and larger needs.

Mr. SAUNDERS. But when that license is to be so given, as shown in the illustration you have just made, that it is practically going to eliminate the privately owned and operated enterprises, we simply would not get them, that is all; I am just trying now to get at the scope of the bill, Mr. Secretary.

Secretary DANIELS. Well, the scope of the bill is for Government ownership—

Mr. SAUNDERS (interposing). And the real scope of the bill is to eliminate—

Secretary DANIELS (continuing). And operation; and then exceptions may be made of cases that do not work any interference.

Mr. SAUNDERS. You think, then, that the stations of private concerns all over the United States—

Secretary DANIELS (interposing). Ought to be governmental owned and operated, for the good of the whole people, and for the national need.

Mr. SAUNDERS. Well, that is going back again into the question of policy. I am just trying to get at what is contemplated in the bill.

Secretary DANIELS. That is what is contemplated in the bill.

Mr. SAUNDERS. You have said that you would give certain special licenses, where it was shown that there would be no interference?

Secretary DANIELS. Yes; if we are given that power.

Mr. SAUNDERS. Well, if the general system is to be governmental owned and operated, if that is to be the policy to be pursued, one little concern—or a larger concern, for that matter, such as the cotton factories I have indicated—would find it very difficult to show that they presented such a case of emergency; or take a hardware concern or any other concern as would justify you in breaking in upon what you think is the wise, broad, general policy. In other words, practically under this bill with the policy you have in mind, there would be no such private enterprise.

Secretary DANIELS. Well, in the main there would not be.

Mr. SAUNDERS. Yes; in the main there would not be.

Secretary DANIELS. It is a Government owned and a Government controlled wireless, because of the peculiar conditions surrounding wireless.

Mr. SAUNDERS. I want to ask you a question of two about that “peculiar conditions surrounding wireless” in peace times; as has already been fully stated and agreed upon, you did not need any legislation, either in anticipation of war, or in the actual, flagrant war for the protection of the country, and of the interests of the country; you have got under the legislation that we have already afforded, ample means of protection and ample authority to that end, have you not?

Secretary DANIELS. During the war; yes, sir.

Mr. SAUNDERS. So that all we are concerned with now, as I stated before, as I understand the purpose of this bill, is that you want us to understand that the commercial future of the country and the commercial interests of the country justify us in taking away from private enterprise and private concerns the right to use the air as a vehicle of communication—not the air, exactly, but the ether, as a vehicle of communication.

Secretary DANIELS. Yes; because the air can not be divided.

Mr. SAUNDERS. Yes; the air can not be divided.

Secretary DANIELS. And it is not only in our own country that we have to consider it. Last year we had a session here in Washington, or an international conference, of all the countries in North and South America, and this question of wireless communication was one of the matters that was taken up there; and it was the sense of that conference, the delegates—not having the power to commit their Governments—that concessions ought not to be granted to private parties, but that governments ought to control the wireless, and we ought to control these wireless stations. And I think it is one of the most important questions of public policy, that everything going into Central America or South America ought to be controlled by the governments of those countries.

And this proposed legislation is the beginning of a great, international, world-wide prevention of interference in wireless communication.

Mr. SAUNDERS. Of course, Mr. Secretary, we are all agreed that the ether itself is a common substance that can be used by everyone in connection with the wireless.

Secretary DANIELS. But it can not be, because if two or more use it—

Mr. SAUNDERS (interposing). Well, but that becomes a question of policy or regulation. I mean that that is the one substance which every wireless system must use.

Secretary DANIELS. Certainly; and if you have too many of them—

Mr. SAUNDERS (interposing). We are agreed on that. Now, with regard to this question, you said the Government should control. That is not necessarily a matter of commercial operation, is it? Control is a very different thing from committing the Government of this country to exclusive commercial use? Is it not?

Secretary DANIELS. My judgment is that in this peculiar method of communication the Government ought to have the monopoly, just like it has with the mails—and even more so: because other people could carry the mails on trains without interference, but they can not use the air without interference.

Mr. SAUNDERS. Well, you state that as your belief; and I am not questioning your belief, of course. But the thing before the committee is, for reasons to be furnished to it, why, in time of peace, for commercial purposes, anything that makes it necessary in our general interests as a country, that the country should, as a government, run the wireless as a commercial system. What is there that requires that? Now, you have got all the regulation you speak of; you said the country ought to control, for the purpose of national policy, these wireless systems. We raised no issue about that.

Secretary DANIELS. You can not control as long as any man may start in operation his wireless apparatus.

Mr. SAUNDERS. Does that affect the national security at all, in time of peace?

Secretary DANIELS. It might, very seriously.

Mr. SAUNDERS. In time of peace? Well, I would like to have an illustration of that. For instance, take those cotton factories, that I have mentioned, in North Carolina or in Virginia; say there are a chain of cotton factories using their own wireless systems in time of profound peace; why is that in any sense endangering the national security?

Secretary DANIELS. As I said, just now, in any case where it did not operate to cause interference, a special license could be granted.

Mr. SAUNDERS. Yes; but you have already indicated, that, with your attitude toward this matter, it would be exceedingly difficult for any man to show that his case was one of special emergency, or that there was no other system of rapid communication; in other words, you have indicated your belief that the Government ought to run these things, and that there would be a very small chance of an individual enterprise bringing itself within the limitations that you have outlined.

Secretary DANIELS. You do not work any injury to those private concerns, because they have the telegraph and the telephone, which can operate without any interference with other people.

Mr. SAUNDERS. Well, I am not considering that at all.

Secretary DANIELS. Well, that is very important.

Mr. SAUNDERS. That phase of it certainly is essential in that connection. But I am just trying to bring out why, for the commercial interests of the country, it is necessary for the Government to be the exclusive and sole commercial operator in the country.

Mr. WHITE. Right in that connection, Mr. Secretary, why was it not necessary to take over these stations which have been allowed to operate?

Secretary DANIELS. We want to take them over.

Mr. WHITE. But it has not been done.

Secretary DANIELS. Well, we hope to do it.

Mr. WHITE. I was wondering what the special reason was; why, if complete domination and absolute control is necessary, they were not taken over during the war, as well as all of the others.

Secretary DANIELS. But they were taken over during the war—everything was taken over during the war.

Mr. WHITE. Well, I thought you said they had not been taken over.

Secretary DANIELS. No; I meant that they had not been bought. We controlled absolutely everything during the war.

Mr. WHITE. I did not understand that, and I was somewhat surprised that you had not.

Commander HOOPER. Mr. Secretary, there is one thing that the committee seems to want to know about, which is more or less technical in character. Do you want me to answer it?

Secretary DANIELS. Yes; I would like for you to answer it.

Commander HOOPER. It should be brought out that the function of radio telegraphy is, primarily, for use where you can not use wires. That is the primary function of radio telegraphy—between shore stations and the ships at sea. A ship at sea can not use a wire to talk to shore; and, therefore, everything should be made subordinate to the interests of those that can not use the wires.

Now, what you are trying to get at, Mr. Saunders, is, why one man should own all the radios and run them, and the Secretary has been explaining that it is because of the interference; it is the interference with the work of the ships at sea—that is the thing.

Mr. BESHLIN. Excuse me; but I want to ask just one question at this point: Does the indiscriminate use of the wireless by people throughout the country interfere with its use by the Government?

Commander HOOPER. It does. I can answer that in two ways: All amateur stations and the coastal stations. There is no use for any other stations in the country just now; and there is no particular desire for them.

The amateur stations can be regulated so that they will not interfere, and still satisfy the amateurs. And the coastal stations are the ones that we want to own, principally because they work the ships at sea; and if one person does not own them all the ships do not get a fair deal—and that is a question of life-saving service. That is a point that we want to bring out, Mr. Secretary.

Mr. SAUNDERS. Now, you have undertaken to answer that question for the Secretary. Let us see if you have answered it sufficiently.

As I understand, there is no difference of attitude in this committee with reference to giving whatever legislation is necessary to provide an efficient sea service—there never has been any disagreement as to that.

Commander HOOPER. Yes; I understand.

Mr. SAUNDERS. Do I understand, in order that you may have that efficient service, you have to operate a system of wireless, commercially speaking, between, for example, Virginia and Florida, or Vir-

ginia and North Carolina, or between any other two points in the United States?

Commander HOOPER. No; there is no demand for that service, because you can get it cheaper by telegraph and telephone.

Mr. SAUNDERS. Well, it seems that there is a demand for it, because the Secretary indicated that the Wanamakers were running a wireless plant.

Commander HOOPER. Well; Wanamaker did that; but I think he was the only one in the United States that did.

Mr. SAUNDERS. Well, suppose there were a demand for that sort of service?

Commander HOOPER. Well, in my opinion, it should not be permitted where it might interfere with the work of the ships at sea.

Mr. SAUNDERS. Of course, we all agree as to that.

Commander HOOPER. And we are trying to get around that.

Mr. SAUNDERS. Of course, you are trying to prevent that. We are all agreed that it should not be allowed if it interferes with the sea service, and yet you propose to allow the amateur to go along.

Commander HOOPER. But not to let him put down a shore station.

Mr. SAUNDERS. Then you propose to control him and prevent him from interfering with the sea service by regulation?

Commander HOOPER. By regulation; yes.

Mr. SAUNDERS. Now, if you can control all of these amateurs all over the country so as to prevent them from interfering with the sea service, why can you not control all of those other people by the wave length, which is the way the interference is prevented? Why can you not control these other people in the same way?

Commander HOOPER. Well, the ships have all got to use the same wave to communicate with the shore stations. And you have to use long wave lengths in order to get those messages over any long distance. The amateurs can use the short-wave lengths, that will not go very far. So that they can use a wave length that we do not care anything about. And if we let everybody in, there would be so many working at the same or about the same wave length that there would be great danger of—

Mr. SAUNDERS (interposing). Do I understand that you state, as a scientific matter, that as a reason for the commercial operation of this commercial wireless system by the Government that unless the Government takes it over and commercially operates all of these systems—that, in spite of your power of control, through regulation, there would be so many wave lengths that they would interfere with the sea service? Is that your attitude, as a scientific proposition?

Commander HOOPER. I would not put it exactly that way. I do not think I made myself clear. If we allow our stations along the coast to work with ships, and somebody else is allowed to have stations along the coast working with ships, we would have to use about the same wave lengths, because the ships all, logically, work on the same wave lengths; otherwise, they would not hear each other.

And it has been proved impracticable to have two companies working at the same time without mutual interference; and for that reason we have purchased these stations; and the Marconi Co. realizes, as well as ourselves—

Mr. SAUNDERS (interposing). Now, you are getting back to the sea service. I will ask you this question: There is going to be a certain

bulk, we will say, in the ether, of business that is going to be done, whether the Government does it or whether private interests do it under regulation; all the time there will be a certain bulk of wave lengths in operation in the ether.

Now, if the effect of those wave lengths, going along criss-crossing—if the private concerns being allowed to operate these systems commercially is going to cause confusion, will you tell me why, if the same bulk of wave lengths exist as a result of the Government's doing this business, there would not be the same confusion?

Commander HOOPER. Well, where it is necessary we can discriminate and not grant a license to those that could not operate without interference. But if the Government was not running it, but the private interests were doing so, it would not be possible to discriminate in that way by the issuing of licenses.

Mr. SAUNDERS. That comes back, then, to the fact that it is not an inherent difficulty that makes it beyond control, but it can be controlled by license and regulation?

Commander HOOPER. Not practically; no, sir.

Mr. SAUNDERS. It can not?

Commander HOOPER. Not practically; no.

Mr. SAUNDERS. Then, how would you do it, if it can not be controlled?

Commander HOOPER. Well, if I were doing it I would do it this way: I would start out and run it just like we are; and then when it was proved that two people could work together and not interfere with our system in any way I would license them if they could not work just as well by telegraph or telephone, but if they could work just as well by telegraph or telephone I would not do it, because it would just mean—where these two particular stations might work without interfering, if you license them on the wave lengths they wanted; but that would just invite everybody else to start in doing the same thing, and there would be two more stations here [indicating] that would want to communicate, and two more here [indicating] that would want to communicate and soon you would be lost.

Mr. SAUNDERS. Well, under a system of Government regulation they would not be able to dip in at all; they would not be able to do so under sufficient regulation.

Commander HOOPER. Well, we would do it well, I think. [Laughter.]

Mr. GREENE. Having just won a fight against autocracy, we would start an autocratic movement by this bill that would wipe out everybody. [Laughter.]

Commander HOOPER. No, sir; this is purely regulation.

Mr. GREENE. Of course, that is what is claimed for it.

Commander HOOPER. There is one point that I can bring out: This art is changing all the time. The opponents of this bill will refer to that fact as their principal reason why they should not be held down. This art is changing all the time, and as it changes we can license them more freely. But the party that is responsible has got to do the right thing.

Mr. LEHLBACH. That license is an afterthought, is it not, growing out of the proposed Government ownership and operation of all the apparatus?

Commander HOOPER. For the present it is not practicable to do it any other way. I have been a wireless officer for several years, and I have been in the operation end here and in the material end, and I have talked over this thing with a number of people abroad and heard what they have to say. And I am sure it is not practicable to do it in any other way just now and have it efficient.

Mr. SAUNDERS. You said that if we leave it so that your department has an exclusive monopoly you will run it well. I am not raising any issue about that. But that does not answer the specific question which I have asked; and I will repeat that, to some extent: Interference in the air is the result of different wave lengths being projected, is it not?

Commander HOOPER. Yes.

Mr. SAUNDERS (continuing). And put in motion at the same time; that is really interference, technically speaking, is it not?

Commander HOOPER. Yes, sir.

Mr. SAUNDERS. If you have the exclusive control of the whole thing, from the standpoint of the national safety, and from the commercial standpoint, the air would be full of wave lengths; there will be just as great a number of wave lengths in the air as if you were operating simply from the point of view of national security and private enterprise was operating the commercial end of it. And if they obeyed the scientific regulations which are necessary to prevent interference, why would there be any more trouble from the point of view of interference, under a privately owned commercial system, than under a Government owned and operated commercial system?

Commander HOOPER. Well, if it was all owned by one private concern, they may be able to run it as well as the Government could. But it should be either the Government or one private concern.

Mr. SAUNDERS. Well, when you start one wave length you can not radically change that wave length; when you start out or project a message, you are going to maintain one wave length in connecting with that message, are you not?

Commander HOOPER. Well, it is all right for that particular wave length and that particular place.

Mr. SAUNDERS. Yes.

Commander HOOPER. But suppose we took the highest practical advantage of the ether, and had as many systems working as possible; and suppose there was some ship down the coast calling for help, and these particular stations were interfering with her.

Mr. SAUNDERS. The coastal stations?

Commander HOOPER. Yes; under Government control we could send out and stop everything in that vicinity.

Mr. SAUNDERS. Could you not provide very easily in your regulations that when such a state of emergency and stress as you have described arose a signal sent out from some Government station would stop operations all over the United States?

Commander HOOPER. They would not hear the signals.

Mr. SAUNDERS. Would they hear them any better if they were Government operated?

Commander HOOPER. Yes; because they would be regulated; we have our district superintendents, and our organization, so that we can regulate the traffic.

Mr. SAUNDERS. Could you not require any private owners to conform to such a system that they could hear just as well as the Government stations could hear?

Commander HOOPER. No, sir; that is, there are private stations, like Wanamaker, who would be working all the time, sending messages from one to the other, and they would not hear such a thing, and would care very little about it.

Mr. SAUNDERS. Well, if you took over the Wanamaker station and other stations, would you undertake to meet the public requirements and handle the messages for them—sending the same messages that they send?

Commander HOOPER. We would cut out those messages; there is no reason in the world why they should be sent.

Mr. SAUNDERS. You propose, then, to eliminate those?

Commander HOOPER. We propose to eliminate the stations wherever there is interference. And those two stations have interfered with distress signals at sea. I have almost cried, at times, to hear ships calling for help when the Wanamaker stations were making such a noise that they could not be heard. It was almost a crime,

Mr. SAUNDERS. Well, why would not two commercial shore stations, if they heard the signals, be doing the same thing? How could you run these stations and meet the public demand, as well as that of the Government?

Commander HOOPER. We would not license two stations operating right alongside of each other, like the Wanamaker stations, that are interfering with the work of ships to-day or work like that; we would say that if we license stations to carry on business, they should be farther inland, where they would not interfere with the work of the ships.

Mr. SAUNDERS. Well, that is another proposition; that is a matter of regulation.

Commander HOOPER. Well, that sounds all right; but it is just the same thing as if you stood on a busy street corner and you made everybody have a piece of paper showing the laws regulating the traffic and expect everybody to carry out all of those laws but not have any policeman there. You can not regulate it as fine as it has to be in the radio business without having one person do the whole business.

Mr. SAUNDERS. That raises a scientific question.

Commander HOOPER. That raises a scientific question, and I would like to add that the opponents of the bill will bring that up in such a way that you gentlemen, not being radio experts, will get the idea that they can do this, and then take the statements of people who have been in the business and our statement that you can not do it.

Mr. HARDY. Let me ask you this question, Commander Hooper: Is not the purport of this whole bill simply the assertion of the fact, or of the proposition, whether it is a fact or not, that interference is very likely to occur with independent and irresponsible stations, and that some one central control and ownership must take the place of varied and diversified control?

Secretary DANIELS. That is the idea, exactly.

Commander HOOPER. Yes, sir: that is just it.

Mr. HARDY. Now, is it your opinion that varied and diversified control would result in such confusion as would be harmful to the whole radio system?

Commander HOOPER. That has been the experience ever since the art began; yes, sir.

Mr. HARDY. Is it your opinion, further, that some one single control and ownership, whether it be private or governmental, is absolutely essential to the effectual working of the radio system?

Commander HOOPER. I say that for all the stations that work with the stations at sea it is absolutely necessary.

Mr. HARDY. As I understand, if you had the inland stations you would not have much concern about them—that they would not be capable of much interference?

Commander HOOPER. If they did not reach as far as the coast we would not have any concern. But nobody wants inland stations.

Mr. HARDY. Because they have the telephone and the telegraph. One other question: An independent radio or wireless station on the coast is licensed, we will say. Suppose you tried to regulate it so that its wave lengths should not be the same as the wave length used by you; can that station change its wave length?

Commander HOOPER. It can change its wave length. Do you mean with that station equipped to work at sea?

Mr. HARDY. Could that station do that without changing its apparatus?

Commander HOOPER. Oh, yes.

Mr. HARDY. In other words, if you had the 20 independent radio stations on the Atlantic coast, all under regulation and order of the Government, to use a different wave length from what you use, is there anything in physics to keep those stations, or one of them, from changing to the Government wave length and then interfering?

Commander HOOPER. Well, it can be done very easily.

Mr. HARDY. They would violate the law, perhaps; but they could do it, as a physical matter?

Commander HOOPER. They could do it; they probably would not, if they were ordered not to do it.

Mr. HARDY. Well, if you had the 20 independent radio stations along the coast who had been directed to use a different wave length to prevent interference, what, physically, is there to prevent them from coming in on the Government wave length or the standard wave length?

Commander HOOPER. Do you mean if they desired to disobey?

Mr. HARDY. If they desired to violate the law.

Commander HOOPER. Well, there is nothing whatsoever to prevent that.

Mr. HARDY. In other words, a station under order and regulation to use one wave length can, physically, use another wave length when it desires to do so?

Commander HOOPER. I will not go so far as to say that. All of the stations are built so that they can change their wave length.

Mr. HARDY. So that the only assurance you would have against interference on the part of those privately owned radio stations would be their intentional obedience to such regulations?

Commander HOOPER. No, sir. There is another point that should be brought out. There are many wave lengths that are established

now. The Government is not using just one wave length; it requires many wave lengths to do the work now. And there are not any wave lengths left for stations that are not working with ships.

Mr. HARDY. Then almost any wave length they would adopt would interfere with some of the Government's operation, would it?

Commander HOOPER. It would, if they tried to work with ships. We must realize that all of the argument is over the stations that work with ships—whether we should own those stations or whether the commercial interests should own them; if they work with ships they must use the same wave length that we use, because that is what the ships use.

Mr. HARDY. In other words, these privately owned shore stations would have to use your wave lengths, and therefore would interfere?

Commander HOOPER. If they work with ships—and that is what all the argument is about.

There are three sets of stations in this bill: The amateur stations, which we can easily allow everybody to use by keeping them down to a short wave length; and there are the coastal stations, which work with the ships, which must use the same wave lengths, otherwise the ships do not hear them, because a ship travels in all the different zones in the world, and must always be on the same wave length, otherwise she would not hear the calls of any shore station, or any other ship that might happen to be passing; they all have to have the same wave length in order to listen in. So that the coastal stations are the ones that really cause the most trouble. And they are the ones where it should be brought out that we must absolutely own those to give satisfactory service to the ships at sea, which is the purpose of radio telegraphy.

And the third class of station is the high-power transoceanic station, as to which no questions have yet been asked, and which use a long wave length that does not concern either the amateur station or the stations of the ships at sea.

Mr. SAUNDERS. Let me ask one question in that connection: You say there would be no difficulty in controlling these local amateurs, because you would hold them down to a short wave length. What would be the difficulty in holding down the Wanamaker stations to a short wave length?

Commander HOOPER. Well; he is right close to the naval station that receives for the ships.

Mr. SAUNDERS. That might furnish a reason why Wanamaker, under those circumstances, should not be licensed there—or anybody else.

Commander HOOPER. Yes.

Mr. SAUNDERS. But that does not change the general proposition. Take some concern that was not——

Commander HOOPER (interposing). Excuse me, but Mr. Wanamaker would object to the amateur interfering with him.

Mr. SAUNDERS. I am not bothering about Mr. Wanamaker's objections. I am wondering why you could not control, in the domestic world, other people just as well as you could control the amateurs. That is a practical inquiry.

Commander HOOPER. There are not enough wave lengths——

Mr. WHITE (interposing). Let me ask you a question there. I do not know much about the technical end of this thing, and I imagine that is the situation with most of the members of this committee. But I have understood that they could tune these receiving instruments so that they would hear or take and receive a particular wave length and would disregard all others. Is that true?

Commander HOOPER. You can not say a particular wave length; you can say a particular wave length in the vicinity of a particular space. That is to say, if you had a piano, and if you were not very expert in music, and you pressed a key, you might not know that it was not one of 20 keys, but you would know that it was not 1 away up on the scale.

Mr. WHITE. I had this idea in mind: That they had these instruments so perfected that a particular instrument would take a particular wave length, and would disregard all other wave lengths; that is, that wave lengths tuned to a certain standard would not interfere in any degree or particular with those tuned to another standard. Now, if that is true—and I do not know whether it is true or not—why should there not be a wave length established for the Naval service, and for merchant vessels, and other people be prohibited from using that particular wave length used for those purposes; that is, for the Government to set aside that particular wave length, and leave all others open to the general public. Now, I am just asking for general information.

Commander HOOPER. Well, it takes more than one length for the Navy and for commercial vessels; it takes a certain proportion of the wave lengths.

Mr. WHITE. Well, suppose you take those and leave all others open?

Commander HOOPER. Well, that is exactly what we have done. We have got the amateurs tuned down to a 200-and-odd meters. That is their block. Then the naval and the merchant vessels are in the next block; that is, say, up to 2,500 meters. And they require all of that space.

Mr. WHITE. Then if you have all of that space reserved for them, what do you want anything more for?

Commander HOOPER. Well, the ships and some of the shore stations can not take everything, because there are long areas where you can not carry them. And the rest, if you could use them on the ships, it would be fine; but you can not; their outfit would not permit.

Mr. EDMONDS. I would like to ask you a question in line with what you have just said, Commander Hooper:

Under the present regulations, no man can have a sending outfit without a license, which gives him certain authority; and that license is revokable at any time, is it not?

Commander HOOPER. Yes, sir.

Mr. EDMONDS. If you found at any time an interference in the Wanamaker stations, you could revoke his license and prevent him from operating a wireless; is that not true?

Commander HOOPER. If we had the power.

Mr. EDMONDS. No; the Department of Commerce has the power.

Commander HOOPER. Well, the fact is that he has interfered with us a great deal of the time for years, and we have spent a great deal

of effort in every way to try to get it corrected and we never could do so, although the Department of Commerce has assisted us to the full power under the law. The fact is, that he interfered with us all the time.

Mr. EDMONDS. Well, that is not in accordance with the act passed by Congress August 13, 1912, which I have before me, which governs radio communication between the several States, and says positively that they must have a license, and then provides that "this license is revokable for cause."

Commander HOOPER. Yes, sir. Well, his license allowed him to use a decrement of a certain amount. That is, that he would not interfere with the wave lengths that the ships were supposed to use; and when they measured his station it was always found to be all right; we would measure it and find it was within the law; and yet the fact was that when we tried to send messages to naval stations near Wanamaker's stations we could not get them or receive them, and it would be the same all the time, back and forth; we said we could not do it, and they said we could; it was that way all the time. But the fact is that the art is so intricate that the law can not be made, or is not made, to cover it correctly.

Mr. EDMONDS. Well, the law is made so that you can revoke his license if he interferes?

Commander HOOPER. Yes; but the Department of Commerce would go and measure their apparatus and say it was in compliance with the law.

Mr. EDMONDS. Well, was that on account of the incompetence of your operators or of his? [Laughter.]

Commander HOOPER. It is on account of the actual conditions that we have to recognize as existing—in the poor apparatus or the decrement, or the poor operators on both sides.

Now, we have come to believe that we have to recognize conditions as they are, and not as they should be.

I can pick out two experts in this room now, and can pick out two naval operators, and two foreign commercial operators, and I can do wonders; I can prove to you that you do not need any laws in radio. And yet you have to figure on the average man that you get aboard a ship, with the pay that is allowed to those operators; you have to figure on what those men know, and you have to face the actual conditions and not theoretical conditions.

Mr. EDMONDS. Did you find in your travels, when you were talking to the operators in other countries, any government ownership of radio systems in any other country?

Commander HOOPER. Yes, sir.

Mr. EDMONDS. I am not talking about war times now; I mean in peace times.

Commander HOOPER. Yes; in France.

Mr. EDMONDS. That is the only one, is it not?

Commander HOOPER. I think the Japanese have Government ownership also.

Secretary DANIELS. Mr. Edmonds, I will say that when Capt. Todd comes before the committee he will be able to give you full information along that line.

Mr. HUMPHREYS. May I ask the secretary a question, Mr. Chairman?

Mr. HARDY. Certainly.

Mr. HUMPHREYS. Is the reason that these privately owned and operated stations interfere with each other and with the Navy the sole reason why the department wants to control the radio system? Is there any other reason, of policy or otherwise, why the department wants to take over the radio business?

Secretary DANIELS. There are only two methods of operating the wireless: Either by the Government or for it to license one corporation; there is no other safe or possible method of operating the wireless.

Mr. HUMPHREYS. That is because of the interference in the ether, is it?

Secretary DANIELS. There is a certain amount of ether, and you can not divide it up among the people as they choose to use it; one hand must control it.

Mr. HUMPHREYS. And that is the sole reason that actuates the department, is it?

Secretary DANIELS. That is the sole reason.

Mr. HUMPHREYS. There is no other reason of policy that actuates the department?

Secretary DANIELS. That is the sole reason, that one hand must operate and control it.

Mr. BURROUGHS. I would like to ask one question: I understood you to say, at the opening of your statement, Mr. Secretary, that it was your understanding that the war had demonstrated the necessity for there being one single agency for the control and ownership of the wireless communication?

Secretary DANIELS. All the evidence was that there must be one agency, and only one agency, to own and control the wireless.

Mr. BURROUGHS. Are you able to say, off-hand, or would you be willing to put into the record, any such specific cases or instances as you have in mind showing that the war had demonstrated that fact?

Secretary DANIELS. I will put into the record an answer to that. I would not be able to do it now; but I would be very glad if you would ask Capt. Todd, when he comes before you, that question; because he has studied along that line and is prepared to go into it more fully than I would be, except by reference to the reports.

Mr. HUMPHREYS. Mr. Secretary, there are several questions that I wanted to ask you; but I do not suppose that you are the one to answer them: With regard to the bill itself, will somebody appear before the committee who has drawn the bill and can explain it?

Secretary DANIELS. Capt. Todd will go into the bill in all its phases when he makes his statement.

Mr. HARDY. Is that all, Mr. Secretary?

Secretary DANIELS. I wish, gentlemen, just to add this, and to emphasize it just as strongly as possible: The wireless is, in a sense, just beginning the great and important work we shall depend on it to do. And, as Commander Hooper said, it is not the purpose to use the wireless where the telegraph or telephone are easy to be used; it ought to be reserved, it ought to be preserved, primarily for safety at sea, and for safety of communication with our neighbor on the south.

And you can not look into the future without knowing that the imperative duty of our Government at this time is to either license one private company and give them the exclusive power and ownership or have the Government to do it, and do it safely, and utilize, of course, the brains of all men who have studied this science. I look to see it become the great means of communication and to lessen accidents and deaths at sea.

The alternative before you is absolute; there is not any escape from it. If this wireless is to be utilized to the best advantage, you must either give it over to some department of the Government and let it absolutely own it, paying royalties to those people who make inventions that will improve it; or you must license some private people to do it. You are going to lose most of its efficiency if you permit any man who makes an adventure and starts a company to go on and use the wireless.

More than that, gentlemen, it has an international aspect. We ought, as a country, to have our high-power stations; no private company ought to be allowed to have the high-power stations in America. They ought to be American owned and American operated; and we ought to have such arrangements with all the South American and Central American countries; and I am certain that we can secure them.

I have taken this matter up very fully with the State Department, with the end in view of an arrangement by which all high-power stations between these various countries should be governmental controlled, governmental owned, and governmental operated. It seems to me that on the eve of large trade in South America, the large expansion of the world trade; it is a matter of primary importance; and that we ought not to delay in laying down a policy.

I ought to say that in presenting this matter it has been studied by all the departments of the Government. The State Department is strongly and earnestly in favor of this as an international necessity.

The Pan American conference approved the policy, and I believe that we have the opportunity now of utilizing wireless for the saving of ships and the saving of men and the saving of national trade and the furtherance of national amity between the countries that we wish to have closer relations with.

I wish to say at the very close that it is my profound conviction and is the conviction of every person I have talked with in this country and abroad, who have studied this question, that it must be a monopoly. It is up to this Congress to say whether it is a monopoly for the Government or a monopoly for a company which will leave it open to whoever wishes to come into it, and in that way you have destroyed its value, in my judgment, Mr. Chairman.

Mr. WHITE. Mr. Secretary, may I ask one question?

Mr. HARDY. At the end of this one question I want to see what time we will meet again.

Mr. WHITE. In order to make this governmental program efficacious, will it not be necessary also to have an international arrangement? Otherwise you might have a Mexican wireless, and a Canadian wireless and a European wireless interfering in just the way you seek to prevent it; is not that true?

Secretary DANIELS. If there are no newspaper men in the room I would like to answer that. I am one myself, but I would not like them to print it. I hope they will not print this.

But in recent months, during the war, certain nations, through corporations not known to belong to other Governments, have sought concessions from South American Republics to put in high-power stations to connect with high-power stations which they owned in America. I think it would be a crime for us in America at this time not to protest and not to go on record that we are going to own all this wireless in America and that no country under the sun can put a high-power station on America unless it is a foreign Government which we understand and which we can control. There are companies now that own high-power stations in America who are seeking concessions in South American countries not owned by a private company, but chiefly owned by foreign Governments which wish to get control of the wireless all over this hemisphere, and we ought not to permit it.

Mr. WHITE. It would require an international arrangement to prevent a Canadian company or a Mexican company interfering with anything we might do under this bill?

Secretary DANIELS. Yes.

Mr. WHITE. The international operation of wireless is controlled by international and political reasons?

Secretary DANIELS. International reasons and physical reasons also.

Mr. HARDY. Will you come back this afternoon?

Secretary DANIELS. Gentlemen, I think I have expressed all the views I have. Capt. Todd, when we meet again, will present an amendment to the bill for your consideration. He will explain it as well as I would.

Mr. HARDY. Then, gentlemen, let me ask what time we can meet.

Secretary DANIELS. Mr. Chairman, I can return at any time you desire, but I have some very important matters to attend to this afternoon.

Mr. GREENE. Send your word by wireless. [Laughter.]

Secretary DANIELS. I will communicate by wireless with you.

Mr. HARDY. We will now take a recess until 2 o'clock.

(Thereupon, at 12.20 o'clock p. m., the committee took a recess until 2 o'clock p. m.)

AFTER RECESS.

The committee reassembled at the expiration of the recess.

STATEMENT OF CAPT. DAVID W. TODD, UNITED STATES NAVY, DIRECTOR OF NAVAL COMMUNICATIONS.

Mr. HARDY. Captain Todd, will you please proceed now with the presentation of the matter in your own way?

Capt. TODD. For the information of the committee, and as an indication of who will best be able to answer questions that may occur to them in the course of the argument I may make in favor of the bill, I will say that I have to do with the administration of radio stations only. I am not in close touch with the details of the apparatus. I

know, in a general way, what has been accomplished, and is being accomplished. I have no ideas on Government ownership as such, and the taking over of the land lines and cables is not my affair in any way. I have no arguments for or against Government ownership; I know nothing about them. As to that, Mr. Daniels is the one that controls the policy.

I have with me an officer, an ex-amateur, who is specially qualified to talk on the subject of amateur installations. And for myself, if the committee are willing, I would like Commander Hooper, who is the officer representing that bureau of the Navy Department which has to do with the purchase of apparatus, installation of apparatus, keeping in touch with technical developments, and all technical matters, to speak on those subjects. He also has all of the business of the department with regard to purchasing apparatus, purchasing concessions, and extension of the system generally.

I know generally what this officer is doing and what the bureau is doing, but I am more concerned with policy than with apparatus as such, so when it comes to asking me questions about the details of technical developments I will not be able to answer.

At the beginning I should like to say that I have here the amendment which Mr. Daniels had in his hands this morning concerning the amateurs. The part of the bill providing for experiment stations I had hoped would cover the question of amateurs. Apparently, from what I have heard, the amateur wishes to be mentioned as such. I had an idea it would dignify the amateur to have his station considered under the head of experiment stations.

I am also wondering whether the word "amateur" should appear in the Government-ownership bill. It did not appear in the law that now governs radiotelegraphy. Two years ago, when a bill which looked forward to Government ownership was argued before your committee, the word "amateur" was mentioned as such. I have every reason to believe that the amateur interests are going to be thoroughly satisfied with this amendment which I shall offer.

Mr. HARDY. Read that amendment, Captain.

Capt. TODD. The amendment is as follows:

Insert after line 6, page 2, the following:

"The term 'amateur station' means a station used for private practice or experiment in radio communication and not operated for profit in either receiving or sending radio signals."

Insert in line 14, page 2, after "training-school stations" the following: "and amateur stations."

Strike out the sentence beginning in line 1, page 3, and ending in line 6, page 3, and in lieu thereof insert the following:

"This section shall not apply to stations belonging to the Government of the United States or the Government of the Philippine Islands, or to experiment stations, technical and training-school stations, and amateur stations, licensed as provided by the act to regulate radio communication, approved August thirteenth, nineteen hundred and twelve: *Provided*, That when such amateur stations are licensed for receiving purposes only no operator's license shall be required for the operator in charge of or operating such station; but when such amateur station is licensed for transmitting also the license shall require that the operator of such station shall hold a license showing his ability to send and receive at least seventy-five words per minute in the Continental Morse code: *And further provided*, That the license for such transmitting station may limit the power input to one-half kilowatt in case of amateur stations within one hundred miles of the Atlantic or Pacific Ocean, the Gulf of Mexico, or the Great Lakes, and to one-quarter kilowatt

within five miles of a Government receiving station. Amateur stations so licensed shall not use any wave length exceeding two hundred and fifty meters nor less than one hundred and fifty meters except by special authority in the license contained."

Mr. HARDY. I understood you to say that that amendment is satisfactory to the amateur people?

Capt. TODD. I do not know, sir; I hope it is.

Mr. GREENE. If there is anybody here that represents the amateur people who could give offhand their view, I should like to hear it.

Capt. TODD. I would like to touch on a number of features with which I am more familiar than I am with this particular subject.

Mr. HARDY. We will not go into that now.

Capt. TODD. Let me say just a few words on past history. The Secretary spoke in general terms this morning of where we stand at present, and a few more details will show why we need more legislation at this time. In the early stages of wireless everybody operating ships saw the immense possibilities of radio communication, and naturally all nations having navies took great, special, and permanent interest in it; and through the liberality of Congress we were able to erect stations on all our coasts, in all our island possessions, and in the Canal Zone. We have maintained that system of stations ever since, constantly increasing the efficiency of the stations, but not finding it necessary to increase the number very materially, except in the case of high-power stations, the use of which became more and more apparent as time went on.

Until 1910 there was no law whatever on radio telegraphy. In those days, whatever you may say about interference at the present time, there was very real and positive interference and a great urgency for legislation. Although at that time, eight years ago, we were promised immediate relief from all kinds of interference, there is still a little interference left; but it is not the kind of interference that I am going to point out now.

In 1912 the first law was passed, the law under which we are now working, which law I am going to try to show is quite inadequate. Immediately following that or the following year the Senate ratified the international convention which was framed in London, and we then found ourselves working under an international agreement as far as ship-to-shore communication was concerned. That international agreement touched very lightly on the subject of high-power stations, but it was forecast at that time that with the increase in the number of high-power stations the next international conference would have to take up that subject and regulate it to the same extent that the ship-to-shore business was regulated by this convention of 1912, which was ratified by us in 1913.

Almost the entire year of 1916 was taken up by an interdepartmental board, which attempted to frame a substitute for the law under which we are now operating, and the board was so large and unwieldy it took a full year to get anything out of it, and we finally came before this committee with a bill to regulate radio communication to take the place of the first one.

That bill failed, under the pressure of other affairs occupying the minds of Congress and for other reasons. But that bill, while it did not sepecifically provide for complete, definite ownership in a definite

time, sounded the principle very strongly, and those who argued for it on the side of the Government made it very positive that that was what the bill was intended to accomplish in time, for reasons that we then brought out.

To get the opinion of the various Government departments on record was comparatively easy at that time, because each one of the departments had a representative on the interdepartmental board that framed the bill. The executive departments indorsed the idea of Government ownership of radio stations used for commercial purposes, with the exception of two—the Department of Justice and the Department of the Interior. They, in different words, brought out the same idea. Several of them were very particular to say that they did not care to have their indorsement of this particular bill indicate in any way their attitude on the subject of Government ownership, which to them was entirely too large a proposition for them to express an opinion at that time, even if they cared to, but this matter of radio communication was a very peculiar and special case which needed special treatment, and that, to their minds, was an answer.

With your permission I should like to read a typical indorsement of the last bill, which will hold good for this one.

The Secretary of the Treasury said:

This bill involves the principle of Government ownership of coastal stations, and while it is a move in that direction it does not definitely provide for such Government ownership. It is the belief of this department that the principle of Government ownership of coastal and commercial stations is sound, and it is further believed that the bill should provide for Government ownership rather than treat of this principle in indeterminate fashion. The chief arguments in favor of Government ownership of this public utility are entirely separate and distinct from those in favor of Government ownership of other public utilities, and I desire to particularly emphasize that this letter is not to be taken as indicating in any degree whatever the views of this department concerning the principle of Government ownership in any public utility other than radio communication.

It will be noted that radio signals can not be confined to definite channels, but are transmitted through a medium to which no specific title can be conveyed to individuals or corporations, and therefore radio signals are not amenable to the ordinary measures of control. Where two or more stations operate in close proximity, as is the case to-day in many places, they mutually interfere, resulting in confusion, the hampering of radio traffic, and embarrassment to vessels in the vicinity depending upon this means of communication. This condition is particularly emphasized in congested commercial districts, such as New York and other important seaports, and it can be effectively obviated only by placing all stations under one control. It therefore appears that to save embarrassment to the Government, to shipping, and maritime interests in general, as well as to the public—all due to radio interference—the Government should exercise full control over this means of communication as far as practicable, and this can be effectively accomplished only through Government ownership and operation of all coastal and commercial stations.

Radio apparatus on board ship is of the greatest value as providing a means for summoning aid should the vessel be in trouble. When such a distress call is broadcasted, experience has shown that the majority of the ship and shore stations in the vicinity answer the call and attempt to get in communication with the vessel in distress; this results in interference and confusion, and oft-times causes delay in rendering assistance. This is of vital importance to the Coast Guard, which is charged by law with the duty of rendering assistance to vessels in distress. Should the Government have the monopoly of coastal and commercial stations, this difficulty would readily be overcome.

The Government, through the Navy Department, now operates as a military necessity a chain of radio stations along the coasts of the United States and most of its outlying possessions; commercial companies also operate radio sta-

tions. If all these existing coastal, commercial, and Government stations were placed under one management, interference—the basic argument for Government ownership—would be reduced to a minimum, first, by discontinuing a number of unnecessary stations, and, second, by enforcing the same set of rules and regulations at all stations. It is understood that the existing naval stations and personnel can take over the commercial radio business and handle it, in addition to the official business now carried on, with little, if any, increase in the expense of maintenance, upkeep, or operation, and that the revenue derived from commercial business, although not sufficient to make the business self-supporting, would materially reduce the operating expenses.

For the purposes of national defense, the enforcement of neutrality, and other military measures, the necessity for Government operation of radio stations is clear, but it is believed the Navy and War Departments can give more detailed views along these lines.

It is believed that the development of radiotelegraphy will not in any way be hindered by the enactment of the bill into law, but that, on the contrary, private enterprises will be stimulated to further effort in overcoming the many difficulties encountered in this means of communication. The scientists of to-day engaged in the solution of these problems are not, as a rule, connected with operating companies.

It is generally admitted by operating companies that the receipts from fees charged for shore-to-ship business, and vice versa, are far less than the operating expenses—in fact, are only nominal—and it is believed the handling by the Government of the shore end of communication between ship and shore would relieve operating companies of a burden.

The advantages of Government ownership of radio stations may be summed up as follows:

1. Advantages to the Government: (a) More efficient service, due to the elimination of interference and to the fact that the Government operators would be kept busy and in practice; (b) no confusion in taking charge of and operating all stations in time of war or when military necessity demands; (c) less difficulty in enforcing neutrality, in so far as it pertains to the radio; (d) increase in Treasury receipts.

2. Advantages to steamship lines, and other maritime interests and to the public in general, particularly large business concerns: (a) More efficient service due to 1 (a); (b) more expeditious rendering of assistance to vessels in distress.

There would be no disadvantages to the Government as the increase in operating expenses over that at present would be practically insignificant. There would be no disadvantages to maritime interests or the general public.

This bill, as I say, failed. It was followed within a few months by the declaration of war, and in accordance with the act of 1912, which was argued before this committee, the President directed the taking over of all the stations in the United States and the operating of such as were necessary for military purposes and as could be operated for commercial purposes by the Navy Department, and the closing of others. That order is still in effect.

The effect has been so marked that we have been able to see how simple the control has been with all the stations under one head, and it seems as if it should be very easy to convince you gentlemen that that is really the final answer as regards the operation of a large number of stations of various kinds inland and along coasts where there may be a great overlapping of effort.

As I said, in 1906, or about that time, the chain of naval stations was more or less complete. Up to 1912 those stations operated only for Government purposes, for emergencies, and to be there as an item of preparedness on the part of the Navy Department, and they handled the business of the Weather Bureau and all the Government business they could.

In 1912, Congress authorized certain of those stations to handle commercial business. This was taken up and developed, and the

department has been handling commercial business ever since, with great satisfaction to itself and with very few complaints from ship owners and others who are interested. Since through the fortunes of war we have had charge of all the stations, we have handled commercial business to as great an extent as we possibly could, keeping in mind the possibility of getting information to the enemy, either directly into Germany or in a roundabout way through Mexico, and the submarine menace. The story of keeping ships quiet has been related to you by Mr. Daniels. That was the main reason for not having business on the Atlantic coast, so that the ships would not give their positions away to submarines equipped with direction finders, with resulting loss of life and tonnage.

Mr. HARDY. You mean by that last statement that during the war the uses of wireless telegraphy for commercial purposes were largely limited through fear of military disaster?

Capt. TODD. Yes, sir: on this coast, and in the case of high-power stations everywhere. The efficiency of receiving apparatus has increased so enormously that the signals of high-power stations will at times cover stupendous distances, and which anything sent from a high-power station on the Atlantic coast of the United States could be read with ease in Germany, there is also quite a possibility they would be able to read signals sent from the Pacific coast of the United States or even from Hawaii. It was considered dangerous enough to justify stopping that commercial work, as very important information concerning the movement of transports or the policies of the United States, as they were developing, could be put into a very simple, innocent-looking commercial dispatch. It would not matter to the sender whether or not the dispatch was sent to a fictitious address; if it could be sent out into the ether addressed to somebody in Hawaii or in Japan it would be sent equally strongly in the direction of Nauens, near Berlin, and be picked up in Germany. It was considered too dangerous, so the high-power work on the Pacific coast was suspended.

The ship-to-shore business will without much legislation, except in one or two particulars, straighten itself out in time, because there is very little money in it. Various companies have tried to make money out of it, and I am informed one of them has made a little, but unless there is a complete monopoly there can not be a lot of money in it, because under the present laws as soon as any firm commences to make money another one can immediately set up a station at no very great cost and take part in the business and take away some of it from the other fellows.

Mr. GREENE. Is not that usual in any commercial business?

Capt. TODD. It is usual in the radio business.

Mr. GREENE. Is it not usual in commercial business? Is there not liable to be competition in it if there is a chance for it?

Capt. TODD. I shall have to leave that for you, sir.

Mr. GREENE. Well, you brought that subject up. It seems to me that according to your idea you would destroy all commercial competition; it would all be a monopoly.

Capt. TODD. I am not arguing against it, sir. I am sure there is a confusion of effort there that results in economic loss. I will say that the operation of commercial radio stations right alongside the

stations already in the hands of the Government or already working for the Government's own purpose is a great economic loss.

The commercial station in some places does not have to operate 24 hours a day. There are a few hours a day when a certain steamer of a certain line is expected along; for instance, down South, anywhere north of Cape Hatteras, there must be a continuous watch maintained for all vessels. The naval stations everywhere must have full crews and must be maintained day and night, because their principal business is the general protection of shipping—not only the ships of the Navy, but all ships. Since they are there and fully manned, and since they have demonstrated that they can handle commercial business to the satisfaction of the ship owner, and the proper administrative details have been arranged to collect the money from the person from whom it is due, irrespective of the flag of the ship and irrespective of the ownership of the land lines connecting with the radio station or the cables over which the dispatch must be further transmitted in order to reach a destination, all of which was worked out by the London conference and is now international law—since that business is already on a firm foundation and working properly, it seems to me a mistake to have commercial stations right alongside of them handling the business if there is no great amount of money in it. I think that in time the ship-to-shore business will gradually drift into the hands of the Government for that reason. With technical advancement, of course, there may come changes, but this bill deals with present-day conditions.

I would like to go on to the matter of the high-power stations. The high-power stations are increasing in number right along. The Navy has its system of high-power stations, of which the first one is across the river here and the last is at Annapolis. The British Marconi Co. has its system. The American Marconi Co. has its system, connecting with the British. The Germans had a fine system of their own started, with two stations in this country, German-owned, and several other stations in their colonies and protectorates.

Mr. EDMONDS. Do you mean the German Government?

Capt. TODD. The German Telefunken Co., which is to all intents and purposes, I believe, the German Government.

Mr. BESH LIN. Where were the plants located in this country?

Capt. TODD. They were at Sayville and Tuckerton, but the Alien Property Custodian has condemned Sayville and sold it to the Navy Department. The ownership of the Tuckerton station is in dispute between German and French interests. In the meantime we are occupying that station.

Mr. EDMONDS. Has that Sayville station sale been completed?

Capt. TODD. I believe it has, sir.

Mr. EDMONDS. There were some complications in regard to that sale, were there not?

Capt. TODD. I do not know, sir; I was not connected with that.

Mr. EDMONDS. I would like to know, if you please, Captain, the price paid to the Alien Property Custodian for the plant.

Capt. TODD. I do not know, sir; but Mr. Hooper will be able to tell you. All questions of stations are under the bureau which Commander Hooper knows the details of. The French have a high-power

system in contemplation, which will include Algeria, the east coast of Africa down near Bombassa; at Saigon in Cochin China; two stations in the Pacific islands—I am not sure which islands, either the Marquesas, the Society Islands or the New Hebrides; and at Martinique down in the West Indies. The Dutch are putting up high-power stations. They have one in Java which they hope in time to have in direct communication with Holland.

Mr. EDMONDS. In these cases of which you are speaking, where there is a Government monopoly, I wish you would mention it, and where there is not a Government monopoly I wish you would mention that also, so we can get some idea with regard to how the other countries are handling the matter.

Capt. TODD. Naturally all the countries engaged in the war or having anything to do with it, or having to do with the preservation of their neutrality, for after-war purposes have control of radio activities in those countries. Immediately prior to the war there was the authentic document of the international bureau at Berne, which has to do with the centralization of international arrangements for the control of radio stations. According to their publication there were 29 nations that had radio stations. Of those 29, 7 had privately owned stations. Of those seven, four were important nations, and the other three were China, Liberia, and Colombia. The four important nations were, first, the United States, Great Britain second, Spain third, and Germany fourth.

You gentlemen know how free the erection and operation of stations has been up to the present time in the United States. Great Britain from the earliest days has backed the Marconi Co. to the fullest extent. Having the greatest need of all nations for ship-to-shore communication, she naturally took the greatest interest in the protection of her commerce, as she has always naturally taken the greatest interest in the laying of cables.

Mr. HARDY. Will you give the committee, as well as you can, the facts leading to the ownership and control of the British Marconi Co., whether it is a Government concern or private, or what?

Capt. TODD. I am a little weak on that subject, sir; but I will say that the British Marconi Co. seems to be, as far as I know, entirely distinct from the Government, but the Government does favor it to the extent of giving it facilities for putting up stations. It does practically the same with that company as we do with the American Marconi Co.; it buys large quantities of apparatus from them and leans on their engineers to some extent. As far as I know, it is not part of the Government. The American Marconi Co. is an offshoot of the British Marconi Co. and anything they do is favored in Great Britain, because that country favors the system. Privately owned stations in Great Britain are all Marconi stations. The British Marconi Co. has an offshoot in Spain as well as in the United States, and they have put up nine stations.

Mr. HARDY. Is there no other company in Great Britain except the Marconi?

Capt. TODD. That I can not say, sir. I believe there are one or two stations that were operated by another company; whether they were commercial or experimental I can not say, but I know there were some other stations.

Mr. HARDY. The reason I was asking that, Captain, was to ascertain whether the radio system of Great Britain, either governmentally owned or privately owned, was practically a monopoly.

Capt. TODD. Practically a monopoly; yes, sir. The other companies are of no great strength.

Mr. WHITE. It is not a monopoly by law?

Capt. TODD. It is not a monopoly by law. However, I am getting in deep water in discussing that subject. I am not very familiar with the British Marconi Co., and my statements are merely hearsay. At any rate, of the 47 stations that Great Britain is credited with the greater part were Marconi stations.

Mr. SAUNDERS. This would be true, would it not, Captain? Having in mind what Secretary Daniels advanced as reasons why we should have Government ownership in this country and exclusive Government operation—namely, shipping interests—there seems to be more reason in Great Britain why they should have that Government ownership and exclusive Government operation than in any other country in the world, having in mind her shipping interests.

Capt. TODD. I personally am convinced that Government ownership will follow in all countries of the world.

Mr. SAUNDERS. I understand, but I say the reasons would be more convincing in the case of Great Britain than with us, conceding that the Secretary's arguments were sound?

Capt. TODD. Yes. I expect Great Britain will buy out the Marconi Co., but I may not have good reasons for believing that.

The Norwegian Government is putting up a high-power radio station. The British Marconi Co. is putting it up for the Norwegian Government, but it is to be a Government institution to handle communications between Norway and the United States, the American Marconi Co. putting up the United States station. This station is erected, and is at Marion, Mass.

Mr. GREENE. How would that affect your operation of the radio?

Capt. TODD. That is a technical matter, sir. Personally I think it would be considerable of a nuisance, and I believe the Marconi engineers think the same.

Mr. GREENE. My idea is that America does not need to take lessons of the British or of any other country.

Capt. TODD. But, Mr. Greene, this is British apparatus. This does not represent the latest American development of the highest type of apparatus. I do not believe the Marconi Co. intends to operate any great length of time in the future with its set.

Mr. GREENE. But the idea that the British Government may have may not be a good example for us to follow. We usually steer clear of all entanglements of that kind, and I am only questioning how far we ought to go.

Capt. TODD. If we were to back one company to the same extent the British Government is backing the Marconi Co. we would accomplish to a very great extent the things we are trying to show here.

Mr. GREENE. That is, you take it monopoly is far superior to any competition?

Capt. TODD. Not superior, but necessary in this particular case.

Mr. HUMPHREYS. Do you mean monopoly of ownership or monopoly of control?

Capt. TODD. Monopoly of operation; the Government should operate them. I do not think you would want operation without ownership, because the funds that would come in to the Government as a return on the investment would not be a sufficient reason. It is a question of doing the greatest good to the greatest number. The general needs of the Nation would be best served by operation under one directing head such as we have had in times of war.

Mr. HUMPHREYS. If you had control in some centralized head it would obviate all the difficulties that have been suggested here, would it not?

Capt. TODD. We have that control in this present law, but the present law provides for too weak a control for any practical purposes. I will explain what I mean. Under the present law the German Government, through the Telefunken Co. or any other company, or the British Government through any company, or the French or Chinese or any other Government, may put practically anywhere in the United States a station of any power for any purpose whatever, and the Secretary of Commerce is required to issue a license.

Mr. HUMPHREYS. Of course we can amend that; we can change the control and adjust it to the requirements as demonstrated by the experience you have gone through. All you want is some centralized control, is it not?

Capt. TODD. May I suggest that that will very probably happen automatically in the case of high-power stations, for this reason: The last international conference took no note of high-power stations; the next must. With the increasing number of high-power stations only the most careful international arrangements will keep them apart. For instance, we have here on the Atlantic coast of the United States four high-power stations. In Europe, in three different countries, there are four more. We have special arrangements by which all four of these stations here can be sending at the same time all four stations over here are sending, and every word going both ways will be received except in bad weather conditions, and there will be no interference in these signals themselves.

Mr. HUMPHREYS. That is not due to ownership; that is due to operation.

Capt. TODD. Due to operation; yes, sir. But I am leading up to the point that you will get only the most careful arrangements necessary if the Government has a large part in the operation.

Now, these four stations on each side can go on indefinitely sending all the time, and they are able to receive all that is sent. But these four stations here [indicating] interfere with four others on the Pacific coast. Those four over there [indicating] interfere with four others in Germany—when she comes to her senses—Austria, Norway, or Constantinople. These four stations will interfere with four more that may be down in the West Indies or in the northern part of South America. These on this side will interfere in the same way with any that may be erected in northern or central Africa.

In spite of the advance in the art and the increase in the number of wave lengths that can be used and the nearness together at which those stations can work, the number of high-power stations keeps

ahead of that always. The art has not yet been able to keep up. I would say that the next international conference, which was scheduled to meet in Washington last year, will take up the question of high-power stations, and I fully expect that the consensus of opinion of the delegates, of the 20 or 30 nations that will be represented there, will be that absolute Government operation of high-power stations is necessary; they will call for it, or they will call for such strict control as to amount to the same thing, which will take the place, to a great extent, of anything we are asking for at this time.

Mr. WHITE. In that connection, Captain, there will come from this bill a minimum of value, so far as these high-power stations are concerned, unless there is also this international agreement, which you expect to follow.

Capt. TODD. Under present conditions we have proper working arrangements with all the nations concerned, except Norway. We have not yet approached Norway on the subject. They have asked us to start the work; but we could not do that on account of our obligations to the allies. We are in close coordination with the principal European allies for this trans-Atlantic work; and, if this bill should be enacted into law, we would have no difficulty at all in arranging direct with the governments for the work of high-power stations, except possibly in the case of Great Britain, where we would have to deal direct with the British Marconi Co. Spain, having no high-power stations, we would have to arrange with Germany also; but we also look on the German stations as Government owned.

Mr. WHITE. In other words, then, if this bill is passed, in order to protect your high-power stations against outside interference, you have got to consummate arrangements with the Marconi Co., or with the British Government, with Spain, with Germany, and possibly with other nations?

Capt. TODD. We have to do it, sir; and that would take place automatically at this international conference. All the nations will be eager for that conference, so as to get their stations working and bring up to date, as far as technique is concerned, the business of handling ship-to-shore messages. The ship-to-shore business has advanced also.

They have an international conference; there have been two of them. I think there is no doubt that the next conference will take place within about a year, and that all nations will be eager to adjust the work of high-power stations.

I know directly what trouble has been involved, what an amount of handling of dispatches back and forth has been necessary to make our stations on this side keep clear of the four stations on the other side and to arrange for handling traffic with people of other nationalities. In Paris, where an international commission sits to keep this regulated, the work is rather heavy and formal on account of being international, and to us it seems as if it were very slow indeed. But it does take careful regulations, and they treat it with great solemnity over there, as something that has to be adjusted with great care. Now, if four stations on each side of the Atlantic have their work coordinated with difficulty and require a commission to sit every now

and then to do it, and a constant interchange of dispatches, when the number of stations that Government and commercial demands will call for are erected and placed in operation, the situation will be very complicated, and can only be straightened out by this international conference.

Mr. SAUNDERS. Captain, is not this true, that your scheme for the future of wireless, as you have it in mind, is for the development of international communication and ship-to-shore communication, and you are not contemplating a development of wireless communication in what I might call the continental United States for use in the land areas of the continental United States?

Capt. TODD. We are not contemplating that, for this reason: The telephone and telegraph are so clearly indicated for such communications that it seems a waste of a very valuable means of communication with ships at sea and with foreign nations to use it for overland work.

Mr. SAUNDERS. In other words, you have deliberately excluded that phase of possible development for the wireless?

Capt. TODD. Yes, sir. May I explain still further?

Mr. SAUNDERS. Just a moment. In that connection, do the people who are interested in the commercial development of wireless agree that that is a desirable and wholesome thing to be excluded from one of the possible developments of science for the service of the world or for the service of our country?

Capt. TODD. Yes, sir; they would agree to it very readily after a little thought. That is for this reason: It is quite possible that two communications can take place in certain parts of the United States, but if two stations here are permitted to work then two more can work, and so on. So you will soon reach the limit of practical communication. Five years from now that may not be so; it may be just as practicable as with the telephone and telegraph.

I might illustrate in this way the greater advantage of using the telegraph and telephone: This is a borrowed idea, but it seems to me very well put indeed. If radiotelegraphy had been discovered first, before land telegraphy, and we had to communicate with New York by sending out a dispatch that could be read also in Cincinnati, Chicago, St. Louis, and Charleston, S. C., and the dispatches from New York to Washington had to be mixed up with those coming from Chicago, and if the telephone and telegraph were suddenly discovered as a means of limiting these various communications to definite channels, maintaining the necessary secrecy and keeping the communications all apart, the discovery of the land lines would seem to be a much more wonderful thing than the discovery of the radio has been, which followed long after the other. It is because the land lines are satisfactory for one purpose and the ship-to-shore communication or overseas communication is satisfactory for another purpose that one should not be encroached upon in the interest of the other.

Mr. SAUNDERS. Just one thought in that connection. You say that under present conditions you do not think the wireless is a practical instrumentality for this domestic commercial use, but that possibly five years from now conditions may be such that it will be?

Capt. TODD. Yes, sir.

Mr. SAUNDERS. Do you think this restricted control, this restriction of development that you are asking for in connection with this bill, would be likely to hasten or retard that development of the wireless which will make it in the future this valuable instrument for domestic communication?

Capt. TODD. From that particular point of view I do not think the Government control of commercial communication will affect it one way or the other. The matter of what the effect of Government control on technical development will be is something I shall have to leave for others to talk about. But you may be sure, just as sure as this bill or any bill is not the last word on any subject, just as sure as such things are possible, the demands of the people will be so great that you gentlemen will pass another bill which will abrogate any feature of this bill that will interfere with this overland radio communication in competition with land lines and the telephone and telegraph or as an adjunct to them.

Mr. GREENE. May I call your attention to the great improvements that have been made in telephone communication, for instance? I recollect myself when I had a telephone put in my office to extend a few blocks it was the wonder of the whole community and people came from all portions of the city to test it. They thought it was a wonderful thing that we could talk by telephone two blocks. Now, there was trouble with other lines then, and that was cured by reason of experience. Why can not you believe that there is likely to be something that will relieve this situation that you want to tie up perpetually? Is there not a possibility of relief by use, by experience, and by the employment even of amateurs? They might discover something; they have done so, and will do so hereafter.

Mr. LEHLBACH. In that connection, may I not ask whether there are not now in use devices which will eliminate the interferences which exist, and are not those devices susceptible to still further improvement, and is it not possible that interferences from operating stations can be totally eliminated?

Capt. TODD. The art is advancing right along, but not as rapidly as the demands of commerce and the Government. You are quite right in saying that things are possible now that were not possible a few years ago. The art is advancing, and some advances are most remarkable, but none of them completely solve any of the problems, except in special circumstances.

Mr. LEHLBACH. As I understand the position of the Navy Department, they ask for this solely on the ground of the physical characteristics of the radio system and for the elimination and control of interferences?

Capt. TODD. No, sir; that is not the sole reason. If I may go on I should like to touch on a very powerful reason for it.

Mr. EDMONDS. Before you go further I should like to ask a question. You said the Department of Commerce was required to issue licenses in case a foreign company came here and asked for an installation. They are not required to do it if they do not want to?

Capt. TODD. I believe I am right, sir; there is no restriction.

Mr. EDMONDS. Are there not any conditions that may exist in the neighborhood?

Capt. TODD. It has to be an American company in name.

Mr. EDMONDS. This is what I mean. If I want to put a radio station alongside of a naval station and ask for a license for it, it can be refused.

Capt. TODD. Not alongside, sir; it must be 5 miles away.

Mr. EDMONDS. They have what they thought was a sufficient restriction as to distance between stations. If they wanted to make it .0 miles they could do so.

Capt. TODD. You could do so, but not the Department of Commerce. You did make it 5 miles at our earnest request, and it took long argument to get you to agree to it.

Mr. EDMONDS. Your department during the war did a great many things, and I do not see why you did not raise it to 25 miles.

Capt. TODD. We are not able to enact laws.

I would like to speak about one very strong reason for Government control, which harks back to the former bill. In 1912, when this present law was contemplated, the possibility of the United States getting into a war was about as remote in the mind of anybody as the moving of the Pyramids to this side, and all interests united in saying that in time of war the President might do anything with our stations. So that was stated in the bill, which has been a great joy to us, in that we did not have to ask Congress for any specific authority to operate stations when the war broke out.

Mr. GREENE. We had a little wisdom at that time. [Laughter.]

Capt. TODD. When the war broke out we had ample authority from Congress to handle the situation. But before the war broke out, when we were a neutral nation, the first thing that happened when the war broke out between Great Britain and Germany was the use of the Sayville station here in our own peaceful land to warn the German cruisers to get out of the way, that war had been declared and the German merchant marine generally on the Atlantic was called to seek cover, and others like the *Kronprinz Wilhelm*, that happened to be at sea with guns in her hold, got the warning so that they knew the war had broken out and could get out of the way and mount their guns and begin to prey on British commerce. As to all those things we were at a loss to do anything. We had no laws to prevent companies putting up German stations to be used against our interests or against the interests of the nations with which we were at peace.

As soon as the menace was discovered, the President issued a proclamation which required the taking over for operating control of the Sayville and Tuckerton stations which were then in German hands or in the hands of German interests, and the Navy Department was delegated to do it, and for the rest of the time, when we were neutral, we did not censor the stations but we actually operated them. We put in them operators and handled the German and other messages direct with Germany all that time, so as to be sure that our neutrality was maintained.

Mr. WHITE. What was the name of the company which operated the Sayville station?

Capt. TODD. The Atlantic Communication Co.

In that way we knew exactly, so far as we could tell from the commercial messages, what was happening; and the dispatches were

so important to the countries at war with Germany that we copied every single one of those dispatches sent between the Nauen station, between Berlin and the Sayville station, and between Eilvese station near Hanover and the Tuckerton station in the middle of New Jersey; and the copies that the Naval Communication Service had in its hands, when we entered the war, as you have been told before, were of vast interest to the Alien Property Custodian, as it represented all the direct business carried on between Germany and German interests in the United States.

Mr. GREENE. That was rather an advantage than a disadvantage.

Capt. TODD. It was a distinct advantage having those stations in operation while we were neutral. When we entered the war, as I say, we were all clear on that question of neutrality, and, thanks to the fact that the British Navy was strong enough to restrain the German navy entirely and soon got rid of the raiders, the neutrality of the other coast stations, the ship-to-shore stations was not a matter of consequence, there being no German ships to speak of loose in the Atlantic or even in the Pacific, it was not therefore necessary for the President to take over these other stations as an emergency measure.

But, consider radio stations not in Government hands in case of a delicate situation. We said in 1912, "There is no possibility of the United States getting into war." Now that this war is over, or the chances of the United States engaging in war again, or having any more world wars, is removed off some years, or possibly forever; at the same time, there are indications that the British Government, at least, and our own is going to take the matter of possible future conflicts seriously enough to maintain a fleet, and seriously enough to be sure that our late enemies will not be able to get a fleet or build an armed force of any kind for some years.

In the delicate days just preceding the outbreak of hostilities with another nation every little act of a government is watched and reported back from one government to another. In that twilight period between the strained relations and actual outbreak of the war, or on the verge of an outbreak, it is very necessary for both sides to begin to look ahead a little and at least get their merchant ships into safe port or back home—anyway, off the high seas—and it is also necessary to begin to move ships around so that the fleet may be mobilized in its proper place for opening the campaign.

You might say right here, "There is no such thing as naval campaign without radio stations operated by the Government." The communications are all in all to fleet operations. If the danger of getting into conflict with another nation seemed to be so closely at hand that the President found it necessary to put the stations under the control of one of the military branches of the Government, that would immediately attract the attention of the would-be enemy, and they would say, "You are trying to avert a conflict and talking peace, but here you are manning your radio stations. You are warning merchant ships; you are gathering your fleet together; you are making other war preparations, which looks to us as if you contemplated this move and were about to strike, so we will strike first." That may seem remote now, but it strikes me as a very good reason which affects the country as a whole why it would be well to have the stations in the hands of the Government long before war

breaks out, so that they will be working smoothly and efficiently and in accordance and with full knowledge of how to work with the fleet, the question of handling traffic in the most direct way, and using the necessary codes and ciphers. If all that could be done and at the same time the entire needs of commerce could be provided for, through confidence reposed in the Navy by Congress, we would have the best arrangement for the national needs and the needs of commerce.

Mr. GREENE. Did you ever consider the question which was brought up by the Secretary this morning of the profit which would likely come out of it? Would that have anything to do with it—the profits coming out of the commercial use of the radio under the direction of the Government—whether, it being a profitable operation, the Government could take that up and get a nice profit out of it, which an individual with skill might take up and try to get a profit to live on, of which the individual would be deprived even though he had the opportunity to get a living out of it, because the Navy had absorbed it?

Capt. TODD. In this particular matter?

Mr. GREENE. I can understand your argument in case of war. But we are pretty near out of the war.

Mr. HUMPHREYS. Your purpose just explained would be in favor of section 6, would it not, even if there was no provision for Government ownership? It provides, "That when the United States is at war or when war is threatened, or during any war in which the United States is a neutral nation, or during any national emergency, such effect being evidenced by proclamation of the President."

Capt. TODD. That is what I was trying to bring out: In an international emergency of that kind, it would be unsafe to make any change in the administration of stations.

Mr. HUMPHREYS. Section 6 there, as I read it, and I wish to say that I have a perfectly open mind on the subject. I am a new Member, and was not here before. I am seeking light. But without any ownership by the Government, section 6 appears to me to cover all the possible emergencies suggested by you, even if it were in private ownership.

Capt. TODD. May I suggest that this is practically what the present law, the law that you enacted in 1912, provides, but with the provision of a penalty. Just now we are able to close any station or take it over, or what not, but there was nothing to deter any one from putting up another station. We would have to find the station and seize it.

Mr. HUMPHREYS. This would add to that?

Capt. TODD. It adds a penalty.

Mr. HUMPHREYS. This provides punishment for people if they undertake that. So that with this in the law, so far as the particular matter you mention is concerned, we will get along under private ownership as well as under Federal ownership?

Capt. TODD. Well, except that question of emergency. If the President in time of emergency—that is, when he expects the country to go to war with another nation, or Congress to declare war, take them over at that time the other nation will say you are making a warlike move. That is the only point I brought out there.

Mr. GREENE. It would be a good plan to make provision for an emergency.

Mr. HUMPHREYS. I assume it would be impossible for us to have a war with any nation and undertake any of the necessary preliminary steps without that Government knowing we were beginning to assemble troops or beginning to mobilize our war resources in any event?

Capt. TODD. This would have to be done before that. The taking over of stations would have to be one of the first things to be done, because a fleet can do nothing without the radio.

Mr. HARDY. If I understand you, Captain, it is that the very necessity we would be under to take over these independent radio stations would not only open the eyes of our possible opponent, but make them think we were preparing for war when we were only taking precautionary steps?

Capt. TODD. And trying to avert war.

Mr. HARDY. And what we want to avoid is being in a position where we would have to take steps which would look like war while we were taking steps to preserve peace.

Capt. TODD. The taking over of the radio stations at such a time would be a distinct menace, because it means operation of the—

Mr. HUMPHREYS (interposing). I was about indulge the hope that this Government will not come into any war of its own choosing, except as a defensive matter. I can not see what difference it would make if some country is pressing to make war, and if we begin to polish up our guns and brighten our swords. That would rather have the effect. I should think, of letting him know that perhaps he had not better be so quick to embroil us. [Laughter.]

Capt. TODD. Perhaps the answer to that is that all the other features of the bill besides this the committee is in a position now to hear, I consider, so far as the operation of these radio stations is concerned, it is a military preparation.

Mr. EDMONDS. I think the Captain wants to have control finally during the time of war, and also during the time of "Too proud to fight" and "Peace without victory." [Laughter.]

Mr. HUMPHREYS. May I ask the Captain one question? You stated just now that the sole reason for the department's desire to take over the radio operations was not due to the interference in the ether of operations by the various agents. The other reason is the one you gentlemen gave, that if the President would have to take these over before war that it would be a warning to the other countries—is that the other reason?

Capt. TODD. Yes, sir; it is a wise precaution, and then there is still another reason. It is an economic waste for a multiplicity of stations to exist in the United States. Since the Government must have its stations, for its own purposes, and can handle the business of commerce, since the business of commerce is fostering commerce in every possible way, this is one other way in which commerce can be fostered by good service and low rates and a unified system through Government stations that are necessary for the national welfare in other respects.

Mr. HUMPHREYS. That argument, of course, would apply to the ownership of a great many public utilities.

Mr. LEHLBACH. That is the argument against private monopoly as against Government ownership in any lines, practically.

Mr. SAUNDERS. If the opinion expressed in answer to Mr. Humphreys's question is sound, ought not section 6 to be stricken out? It seems to me that is just making trouble for us. There you contemplate doing certain things which you say if we do will calculate to embroil us in war.

Capt. TODD. Judge, it would not harm the bill very much to strike out that clause, because it was already enacted into law by you six years ago, except the penalty clause. Understand, that in time of war the President has full power to close any station as soon as he discovers it, but the enemy agent may put up another station in the forests of Maine or in the mountains of North Carolina.

Mr. SAUNDERS. Another reason, it seems to me, that ought to go out is that you have a policy contemplated in section 2 where there is going to be these other stations.

Capt. TODD. There are other stations that are contemplated in section 2.

Mr. SAUNDERS. Do you contemplate in this that the Government is to be absolute in the whole wireless field, and there is not to be anybody else in it?

Capt. TODD. You have not read the bill, because there are other stations provided for.

Mr. SAUNDERS. Those in section 5 are not contemplated to give trouble in times of national emergency or war. On the contrary, as the Secretary intimated, the difficulty of getting any station of that kind would be negligible.

Capt. TODD. Understand, the bill takes over commercial stations only. There are other stations privately owned by the thousands that are closed temporarily by the war and will reopen.

Mr. SAUNDERS. But section 2 contemplates taking over everything?

Capt. TODD. Section 2 contemplates taking over everything of a commercial nature.

Mr. SAUNDERS. It does not say that. It says that—

The President shall requisition and take permanent possession of, for the use of the Government, every radio station on land or on a permanently moored vessel now in existence within the jurisdiction of the United States or any of its possessions, other than experiment stations, technical and training-school stations, and stations belonging to the United States or the government of the Philippine Islands.

Those would have to be in existence by virtue of these special licenses, and those would be so hedged about that you do not contemplate any trouble from them. It is these commercial stations you have been describing as possible sources of trouble?

Capt. TODD. Why could not an enemy station put up a station and have it ready for use in time of war? There is nothing to prevent that.

Mr. SAUNDERS. It is conceivable, but it has been so remote that it has not been in your mind up to the present.

Capt. TODD. I do not believe I understand your suggestion.

Mr. SAUNDERS. You have not suggested that any of these little school stations as operated would have to come in under this special license. I refer to amateur wireless operators.

Mr. HUMPHREYS. That is to be taken care of, Judge, in the emergency which he suggests in time of war when there might be some amateur stations. That is taken care of, because it says when war is threatened the President takes control of the radio.

Capt. TODD. Only in time of war.

Mr. HUMPHREYS. In time of war is the only time you need it?

Capt. TODD. Yes.

Mr. EDMONDS. In section 2 it says that "the President shall requisition and take permanent possession of, for the use of the Government, every radio station on land," etc. Suppose the man did put up a station?

Capt. TODD. But there is no punishment in the present bill.

Mr. GREENE. You now put that punishment in the bill.

Mr. HARDY. If you have experiment stations which otherwise the Government might want to take over, section 6 gives power.

Mr. SAUNDERS. They leave that as a possible source of danger. That is what we have been discussing, that you ought not to allow these special licensed operators, because if you allow them, then under section 6 you would have to take those steps and that would aggravate these other nations and provoke these hostilities.

Capt. TODD. These other stations are as necessary to the Government as the Government stations themselves, because the Government does not undertake to assume responsibility for the development of the art of radio telegraphy.

Mr. SAUNDERS. Then you would have to take chances as to these other stations?

Capt. TODD. They will operate with a short wave length and the possibility of their doing harm is not great enough to make it necessary to eliminate them.

Mr. SAUNDERS. Then it comes to what I said a moment ago, that from those stations under that section the danger would be negligible?

Capt. TODD. Negligible; yes, sir.

Mr. SAUNDERS. So that really you do not need section 6?

Capt. TODD. We do not need section 6, and it could be wiped out of the bill.

Mr. EDMONDS. Captain, was it your intention to take possession of all the manufacturers of radio apparatus?

Capt. TODD. Not at all.

Mr. EDMONDS. The bill reads: "The term 'radio station' means any place, vessel, or vehicle containing apparatus used, or capable of being used, for transmitting or receiving signals."

Capt. TODD. That is, the place where the apparatus is put together into a complete set naturally must have some means of testing itself, and that is a special license under the head of "technical and training school station"; that is, it is used for the purpose of developing the art of radio telegraphy.

Mr. EDMONDS. But you certainly want a manufacturer to put up a station to see whether or not his apparatus is correct?

Capt. TODD. Yes, sir; and to try the thing on an antenna provided for under this bill.

Mr. EDMONDS. Of course, he would have apparatus capable of *being used for transmitting and receiving signals?*

Capt. TODD. I can see that if he has apparatus stored in the warehouse that would be a radio station, but that is beyond my power to stretch it.

Mr. EDMONDS. Of course, you realize that after this bill becomes effective there will be no radio schools, but simply experimental amateurs, because there will be no place for a man to get into a position. Suppose a one-armed man comes back from the war and studies radio, what good is it to him, since he can not get into the radio and can not get into your stations and he can not operate anywhere else?

Capt. TODD. A one-armed man has a lot of other occupations closed to him and I do not see why the radio should be picked out particularly.

Mr. EDMONDS. Here is a business for a man who comes back from the Army with one arm. It is a recognized business.

Capt. TODD. He can be kept in the Navy or Army.

Mr. EDMONDS. He can not be kept in the Navy, because you will not accept him if he comes back with one arm.

Capt. TODD. I think he would be kept in the service if he can perform certain military duties.

Mr. LEHLBACH. Assuming that he was not in the Navy, but assuming he was in the Army he could not get into the Navy, although he might be retained in the Navy.

Capt. TODD. He could serve aboard a merchant ship.

Mr. WHITE. Section 1 provides for the taking over of every radio station on the land and permanently moored vessels. Do you seek to exercise any control over a vessel of the United States on the high seas which has wireless apparatus?

Capt. TODD. Only the control that the Government is required to keep over her by the international convention and all the nations over their own ships.

Mr. WHITE. I figured that if the powers proposed in this bill were granted to you, you would undertake to control the selection or the employment of radio operators on merchant vessels of the United States?

Capt. TODD. No, sir. We are having to look out for that for the present, until commerce can be readjusted, but we certainly would not be expected to operate sets on board merchant vessels not in the hands of the Government.

Mr. WHITE. I wondered how you would control the merchant vessel and the operator on a merchant vessel.

Capt. TODD. If he violated the international regulations he would be complained of very promptly by some other nations, and his operator's license would have to be revoked.

Mr. WHITE. In that connection, might he not violate the provisions or the purposes of this law without violating any international regulations?

Capt. TODD. This is in addition to the international regulations. This is not contrary to anything in the international regulations. This furthers the purposes of international regulations.

Mr. WHITE. But, as a practical question, what I was getting at was this: I do not know anything about the international regulations, but I was inquiring whether a merchant vessel outside of New York or

anywhere else or any number of merchant vessels might not be operating their wireless and interfere with your purposes just as much as a radio station on land?

Capt. TODD. Oh, yes, sir; they could. They sometimes do.

Mr. WHITE. I was wondering how you were going to control them.

Capt. TODD. The operator's license would be subject to forfeiture for disobeying the rules he has sworn to carry out when he accepts his license. I believe he is put under oath for secrecy, but he is granted a license for a certain grade in recognition of his ability and reliability and his willingness to do as told and carry out the laws of the country. The international convention when ratified by the Senate becomes law.

Mr. WHITE. There is nothing in this law which touches a vessel on the high seas.

Capt. TODD. That is supposed to be fully regulated at present, sir.

Mr. BANKHEAD. What is the situation with regard to commercial stations which were in operation before we entered the war, as to being operated or closed down?

Capt. TODD. All but 16 that were in operation before the war. Understand, the Navy was operating a great many stations commercially before we entered the war, in accordance with the law passed by Congress in 1912. All the commercial stations in the country are operated by the Navy at the present time and will be, and all but 16 of those have been purchased and incorporated into the naval communication system. There are 16 stations that would have to be purchased under the terms of this bill.

Mr. WHITE. Are there any special reasons why those 16 stations were not purchased?

Capt. TODD. They were not for sale. We expect to make arrangements for some of them. There is a possibility of buying the stations in the Hawaiian Islands. It seems as soon as the coast was clear there they would be very ready and willing to sell, but the other stations are not for sale, as far as we know.

Mr. LEHLBACH. Captain, in case they had been on the market, you would have bought them?

Capt. TODD. I would have bought all that were available if I had anything to do with it.

Mr. LEHLBACH. And in that event this legislation would not have been necessary. You would have simply made a monopoly of the radio commercial business without this legislation?

Capt. TODD. Except as to two points: There would be no prohibition for other companies to start up, or the same companies to start up and put up other stations, starting a new system paralleling the systems already in existence, which are more than sufficient to cover the country for Government and commercial purposes; and the other point is the question of authority from Congress to handle commercial business. That is tied up with the question of private operation of stations commercially.

Mr. BANKHEAD. Has any provision been made for compensation to owners of these privately owned stations that have not been taken over for their idleness during the period of the war?

Capt. TODD. Yes, sir. Their commercial stations are being paid for on a rental basis, and it is costing the Government a good deal of

money which it would not, of course, if the Government owned the stations.

There is one other feature of the bill——

Mr. HUMPHREYS (interposing). It is contemplated under this bill that you will license people to operate radio stations in the future?

Capt. TODD. Yes, sir; but not for commercial purposes.

Mr. HUMPHREYS. And if they run for three or four years, for instance, and you decide to take them back, that they are interfering with the receipt of messages, etc., you take them over, then you provide, here, as I understand it, in section 8, to pay them whatever the damages are?

Capt. TODD. No, sir; the idea is to buy them outright.

Mr. HUMPHREYS. It says here:

When any radio station is requisitioned, taken possession of temporarily or permanently, or closed——

Capt. TODD. That is in time of war.

Mr. HUMPHREYS (reading):

or its license revoked or suspended, the United States shall pay to the persons interested therein just compensation for the property or interest so taken, provided that a claim for said compensation is made to the Secretary of the Navy within two years after the date of the passage of this act.

Capt. TODD. That is in time of war; that is section 6.

Mr. HUMPHREYS. No, sir; that is section 8. It comes right after section 7, which says, "And if, in the opinion of the Secretary of the Navy, the operation of any radio station would interfere with the receipt of signals by radio stations," etc., that the Secretary of the Navy may then, under those circumstances, etc., take them over; and then the next section provides the method for compensating them therefor. They may run them several years before that emergency arises. A man may operate for five years, for instance, under his license, and it then might become advisable in the opinion of the Secretary of the Navy to revoke the license?

Capt. TODD. Yes, sir.

Mr. HUMPHREYS. And then under section 8, as I understand it, do you undertake to pay him for them?

Capt. TODD. Yes, sir.

Mr. HUMPHREYS. But you have this peculiar provision in there that I would like to have you explain. You pay him provided he files a claim within two years after the date of the passage of this act. Suppose he runs three years before you conclude to take it back; then he is out?

Capt. TODD. I see what you mean. This is intended——

Mr. HUMPHREYS (interposing). I was wondering why that limitation was put there.

Capt. TODD. That is intended to cover the taking of these commercial stations.

Mr. HUMPHREYS. Whatever it may be intended for, that is not what it says it covers.

Capt. TODD. The wording is defective.

Mr. HUMPHREYS. It says under certain conditions the Secretary of the Navy may revoke these licenses when it becomes apparent to him that the operation of the station is interfering with the receipt of messages, etc., he may revoke the license, and then immediately

follows a section which undertakes to provide that these people shall be compensated, but he can only be compensated in the event he files his claim within two years after the passage of the act.

Capt. TODD. That is defective. It is intended to cover all cases of interference with commercial activities in accordance with this bill. That was the intent, and the "two years" was put in the wrong place. It was intended to cover simply compulsory purchase of the 16 stations I spoke of.

Mr. HUMPHREYS. Beginning with the words "Provided that a claim for such compensation is made on the Secretary of the Navy, within two years after the date of the passage of this act," down to the period would probably just as well go out?

Capt. TODD. Yes, sir.

Mr. HUMPHREYS. Or, let us strike out all after the words "Secretary of the Navy."

I would like to ask you one other question, if I may, Captain, and I want to assure you again I am not asking these questions in a controversial spirit, because my mind is entirely open on the subject. Naturally, I imagine everybody opposes the Government engaging in any operation that private parties can engage in for profit as well as the Government, unless there is some very strong reasons for it. I would like to know why, in your opinion, everything that you have in mind could not be effected outside of this economic waste that you have suggested here by some governmental control—for instance, require that everybody who goes into this business shall take out a license; prescribe some reasonable rules for the operation of it. Of course, naturally, nobody is going into this business if there is such confusion that you can not send messages. They probably would not want to go into it then. They would probably want some reasonable regulations. Why should not the Government provide that nobody should go into this business except they took out a license and the licenses prescribed certain reasonable rules that experience has shown necessary?

Capt. TODD. That is the present law, sir. But it would not be up to date to cover present conditions, and the simplest, surest, and most complete way of doing it, and one which I believe you will very probably enact in a reasonable time, is the inclusion under one management of all the radio stations. And I believe that all Governments will have the same thing within a very few years. I think it is coming, for various reasons.

Mr. HARDY. Do you think it would be a wise thing to have the naval radio service owned by some outsider, some ordinary citizen who was making money out of this monopoly?

Capt. TODD. If there be no more wars, sir. As long as we have the Navy, we must have the radio stations wherever our ships will be required to operate.

Mr. HARDY. If the Navy has to have under its own control a certain large percentage of the radio service, as I understand it, you would not, and probably no one of us would favor putting that radio service under the control of an ordinary citizen, but we would want that under the Government control.

Capt. TODD. It must be, sir.

Mr. HARDY. As I understand it, also, it would be a great waste economically to have two systems operating side by side?

Capt. TODD. Yes, sir.

Mr. HARDY. And you think one system would most economically transact the radio service both commercially and for the Navy?

Capt. TODD. It could serve the Government needs, not only the Navy but, we will say, all Government vessels and the Weather Bureau, but would also serve the needs of commerce at the same time, with the same stations and the same personnel. They can do it and have done it.

Mr. HARDY. Now, the general economy for the public—

Capt. TODD. For the general good of the whole, yes, sir; a very great benefit to commerce.

Mr. HARDY. Since we have to have that naval service anyhow, what is the essential reason for objecting to the naval radio stations doing commercial business?

Capt. TODD. There is none; and you have enacted into law in 1912 that very provision, and we have been taking advantage of it and have handled commercial business for six years very successfully to our satisfaction, and I hope it will be shown by the letters that come to you, to the satisfaction of Congress to a great extent.

Mr. GREENE. We are getting them on the other side pretty largely, in opposition to the bill, and we have not had any declaration favoring the bill except such as have come from yourself and the Secretary.

Capt. TODD. Yes, sir; but undoubtedly you will have some.

Mr. GREENE. I am going to suggest this: Harking back to the early days before the days of telegraphy and other things, and before the days of travel by cars, the country started with very small beginnings and it has grown, and developed, and widened, and broadened, and beaten out all other nations, and now we come to tie everything up so tight that we have to be careful where we step. We have got to have our possibilities bound up by cords that we can not break. We would be punished if we undertake to do anything. I am of the opinion—I have lived longer than some of you around me—that it is too much to ask the people of America to punish the people of America by restraining all their abilities and opportunities and all their hopes and expectations. You have to have some place of opportunity that young men can in the future get into, because they can not get into the Navy because the Navy will not increase as it has during the war, and the Navy bottles up and keeps for itself the opportunities and keeps everybody out. That would be a broad proposition that would affect me very slightly.

I do not believe in any such thing, not even the suggestion of my friend, the presiding officer, Mr. Hardy. He and I do not agree on that kind of a proposition. I believe in the broadest chance to the American, and especially to the coming American, and the coming American would be fully equal to the present, because the opportunities of education are far superior to what they were in my early days. I had no opportunity of education. I may have had the opportunity, but I did not have the ability to secure education, but had to go to work; and the youth that grow up to-day, even the young men born poor, have every opportunity, and I want to have them have some inspiration. This bill ties up all the inspiration that every young man has.

Mr. ROWE. Captain, did I understand you that the English Marconi system had practically all the stations in England?

Capt. TODD. If I said it, I do not speak with sufficient knowledge to say how many. The British Government has some stations, but the commercial stations the Marconi has are larger than any other company.

Mr. ROWE. Does the British Government maintain, as we do, separate stations under the control of their Navy?

Capt. TODD. Oh, yes, sir.

Mr. ROWE. Very much as we have in this country?

Capt. TODD. Yes, sir.

Mr. ROWE. Do you know how many?

Capt. TODD. No, sir; I could take it out of the reports.

Mr. EDMONDS. Captain, just as the present time the Marconi people are exceedingly active all over the world in establishing stations, are they not?

Capt. TODD. Not that I know of. I have mentioned those——

Mr. EDMONDS. They are endeavoring to establish stations in South America?

Capt. TODD. Yes, sir.

Mr. EDMONDS. You know that, do you not?

Capt. TODD. Yes, sir.

Mr. EDMONDS. They have representatives down there endeavoring to get in connection with the different governments?

Capt. TODD. Yes, sir; but I do not know with what success.

Mr. EDMONDS. Is that being done by the English company?

Capt. TODD. I do not know whether the agent was English or not; he may be either.

Mr. EDMONDS. Is there not a company known as the American Marconi?

Capt. TODD. No, sir; the Pan American Wireless Co. is a separate organization, an offshoot, apparently—from the personnel of the officers of the company—of the American Marconi Co. and the Federal Co.

Mr. EDMONDS. And if this company were to establish through South America private lines or partially governmentally owned lines, whatever they may be, in accordance with the terms of the Government, it would be in control of Americans, so far as you know?

Capt. TODD. Yes, sir.

Mr. EDMONDS. I want to ask you a question in connection with that: If they were to put a line in Mexico right across the Rio Grande and have a tremendous station there that would reach pretty near all over the world, and they were to be in telegraphic connection with this country, even if you controlled the wireless in this country, how could you prevent information going out of the country without control of the telegraph and telephone?

Capt. TODD. We could not prevent the information getting out of the country.

Mr. EDMONDS. You could not prevent it?

Capt. TODD. No, sir; unless you established censorship, and then you would not be sure of it then.

Mr. EDMONDS. Then control of the wireless is not going to prevent information getting out of the country, whether you take the wireless

over right now, or just before threatened war; it is not going to be of any advantage in any case?

Capt. TODD. It will shut off one channel. The information could still go across the borders.

Mr. EDMONDS. I think, when you were here before, I asked you that question, and you said that eventually you thought that the Government would have to control all the wireless?

Capt. TODD. Yes, sir.

Mr. EDMONDS. We talked about land stations and sea stations, and you said they would all have to be taken over eventually?

Capt. TODD. Yes, sir.

Mr. EDMONDS. Now, we are bringing it up to a point where the Government will have to control the telephone and telegraph for the same reasons?

Capt. TODD. I have no ideas on that, sir; that is entirely a separate item that I want to be very clear with.

Mr. LEHLBACH. The only reason that would apply to wireless that would not apply to the telegraph and telephone is interference by reason of physical characteristics of the radio. Every other argument applies to telephone and to telegraph equally with the radio, does it not?

Capt. TODD. No, sir; because what passes over the telegraphs and telephones is secret, except between the points through which the lines actually pass, and if any news is passed between the United States and Mexico it is peculiar to those countries; if any news passes between the United States and Germany it is peculiar to Germany, Great Britain, Austria, and to Japan. Instead of wireless sending in one direction it sends in 360 or 10 times that number of directions, and can be received equally well in any part of that circle as in any part of the European circle.

Mr. HUMPHREYS. I mean in times of peace, would not that be a matter of consideration of the people who were transmitting this information? A man wants to send a radiogram to Germany in time of peace, knowing that a man in Mexico may read it, that is more or less his business, is it not? If the Government owned it all these neighboring nations are going to get the information just the same, if this man uses it commercially. You realize when he sends his message, if he wants to preserve secrecy he has to take that chance.

Capt. TODD. That is the great difference between the cable and the radio. The cable has two definite ends, and what is going on one end is taken off the other, and no one in between knows about it. The radio has a thousand ends, and therefore there is no secrecy to it, even with codes. We know by our experience that codes and ciphers are very easily broken by an expert, and the secrecy is not obtained.

And right here I would like to call attention to one point: The receiving station should be licensed. At present, anyone can put up a receiving station anywhere and receive anything. Not only the business of the Government with its ministers and ambassadors across the seas; but the business of all foreign governments is open to him. He may intercept all of it. If he does it for practice, it is nothing. If he is an expert in breaking codes and ciphers, it might mean a lot to him.

Then, the personal messages between members of the same family, one aboard a ship—become public property. The commercial messages may be intercepted by rival firms and use made of the information obtained. A firm in New York, sending a radiogram to an agent in South America, to drum up some business, if he communicates with his home office and says anything of importance, a rival firm may have a receiver which is taking every bit of it and is using it to their own advantage.

The receiving stations should be licensed, so that some definite hold is maintained on the personnel. They must know the nationality and the good standing of the operator of the receiving station. They must know where it is, so that we can know where the leaks are, and we must protect international dispatches, commercial dispatches, and press dispatches.

Mr. HUMPHREYS. That is applied to cable, as well as those that come through the air, I suppose?

Capt. TODD. No, sir; because the cable messages are not public property; and, at present anything sent by radio—not during the war, but in times of peace—is public property, because a very sufficient receiver is only a matter of \$200, \$300, or \$400—I stand corrected on that—and very little else. It does not take high powers any more or long stretches of wire, being but a simple frame with some wires wound around it connected with an instrument that covers no more space than that [illustrating], and anybody can have that without a license or reference to anybody.

Mr. HUMPHREYS. Just without reference to your illustration of your idea that the Government operation of the radio system would make against economic waste, it would be interesting to cite some activity that the Government has engaged in upon which you predict they hope that it would make against economic waste.

Capt. TODD. I have only the specific instance I mentioned; sir. understand the Navy's business is to be prepared for war. The preparation, or one of the most important preparations, for war these days is efficient radio stations. The Navy must have the most efficient radio operators obtainable as fast as we can get them into the stations. It must necessarily constantly keep up with technical progress. That is what we are paid for—to be prepared for war. We have the familiar experience of having within a few miles—50 or 100 miles—a station, with about one-tenth the operating ability of the naval station, handling all the commercial business, and the naval station is being restrained to handling weather reports, storm warnings, cases of distress, and the communications with Government ships that pass. We can not keep the ships of the Navy cruising up and down the coast to give our stations practice. As a consequence, our naval stations, which must be there fully manned with the latest operators, sits idle while all the work is handled by a station in the hands of a commercial company that is least able to do the work.

That is one of the points of this bill that I wish could be enacted, if nothing else were here, the question of unrestricted handling of public business by naval stations.

Mr. EDMONDS. Just at present you are restricted by law?

Capt. TODD. Yes, sir.

Mr. EDMONDS. And yet at the same time you are doing all the commercial business that is done by wireless to-day?

Capt. TODD. Yes, sir.

Mr. EDMONDS. But when the war stops you are, of course, going to be limited then to the amount of commercial business that has not got a station available to handle it?

Capt. TODD. Yes, sir.

Mr. EDMONDS. You want a little loosening up on that, I presume, so as to handle commercial business a little more readily?

Capt. TODD. It is contained in a provision, section 10 [reading]:

That the Secretary of the Navy shall, so far as may be consistent with the transaction of Government business, open naval radio stations to general public business under regulations prescribed by him, and he shall fix the rates for such service.

That is in reference to high-power stations.

Mr. EDMONDS. If you took over all of the radio you would not want that section in.

Capt. TODD. It would not be necessary, except that the previous law does not specifically apply to high-power stations. The high-power stations are not specifically enumerated by the previous act, and the situation in the Pacific is deplorable, in that the cable facilities are very meager, and the commerce is crying loudly for help and the Government now has a chain of stations reaching across the Pacific. The Marconi Co. has also a chain. They are all needed to handle the Pacific communications, and there are great changes going on in the world now and the demands on radiotelegraphy are going to be very great and many of those demands will be the demands of business and thinking people to get the American point of view and the American news into the far corners of the earth. It would be a very great waste for the Government to keep its own high-power stations quiet and forbid itself authority to handle this commercial work when so much good can be done by it.

Mr. HADLEY. There is no provision in the present law against the Government transacting as much commercial business as it sees fit in other points where there are no private stations?

Capt. TODD. No, sir; but the high-power stations are not covered specifically enough. The wording seems to point to general public business between the ships and shore. It does not cover specifically the operation of power stations, and any high-power station that happens to be within a hundred miles of a commercial station would be prevented any way.

General permission to handle commercial business by high-power stations is very, very desirable; if not the value of the stations to the Government will be very much reduced.

The press has shown, I have noticed in a number of places, a very great desire to use the high-power stations for the transmission of press items—the big press associations. They have asked us again and again to do it, and we have had to say in time of war it could not be done on account of our international agreements with the allies not to handle anything except Government business, and the fact that if we, so far as the Pacific is concerned, took up press, we would have to consider it the same as commercial business, and commercial business was not deemed safe to handle.

Mr. EDMONDS. Would there be any international complications arise from taking over these by the Government?

Capt. TODD. The international complications would be relieved, because the Governments in Europe would not have to deal with us and with the other owners of high-power stations.

Mr. EDMONDS. And yet the Governments in Europe are very jealous of the success of their merchants and their commercial chances in different portions of the world.

Capt. TODD. Yes, sir.

Mr. EDMONDS. Would the handling of this by the Government of the United States lead them to suppose that information was leaking from the United States operators to individuals that was giving information in regard to commercial business?

Capt. TODD. No, sir. The action of this Congress in enacting this bill, would, to those knowing anything about the subject, having studied the subject, appear to be a very logical and proper action, an action which I believe the Government will take. There are only a few Governments now that allow private stations at all, and I look for none inside of four years, and I would not be a bit surprised if the next conference did not contain an international agreement to have at least the high-power stations in the hands of the Government.

Mr. EDMONDS. And yet the great commercial nations of the world, England and Germany—

Capt. TODD (interposing). Germany has only three stations, and they are in her protectorates, and she did have two on our own shores.

Mr. EDMONDS. And yet you say all the wireless in Germany was virtually governmentally controlled.

Capt. TODD. Yes, sir.

Mr. EDMONDS. England and Germany and the United States—the three great commercial nations of the world—have not owned their wireless. These other nations have been forced to build Government wireless stations and have Government wireless stations for the simple reason that no private person was encouraged by commercial business to build wireless.

Capt. TODD. That may be the reason.

Mr. WHITE. You say that there are only seven Governments that do not control their wireless. Does that mean that all other Governments forbid private wireless enterprises, or that private enterprise has not undertaken the development in these other countries?

Capt. TODD. It means that the operations of stations is in Government hands.

Mr. WHITE. Private operation is forbidden, or it just happens that the Government has got it?

Capt. TODD. In some cases, in the weaker nations, say, in South America—I don't know whether I would say that.

Mr. WHITE. I wondered what the fact was, whether it was simply a case of where the Government had gone ahead and made arrangements, or where the Government had forbidden private enterprise to do it. It might make a very material difference.

Capt. TODD. I can not say positively as to every one of these nations, but the majority of them have positive laws requiring the Gov-

ernment monopoly, that no radio stations shall be operated except by the Government.

Mr. BURROUGHS. How effective is that regulation in those countries, do you know?

Capt. TODD. I do not know. I know that they have no advertised commercial stations; they are all down as Government stations.

Mr. BURROUGHS. What is to prevent, in case you get this legislation, some one from erecting one of these little stations that you speak of and cutting in and getting these messages and you not know anything about it?

Capt. TODD. Nothing at all. The receiving outfit might be set up in this room, and with the best operators could receive messages from Germany right here without it showing outside. But it provides the penalty for doing anything of the kind. It is like any other law that is broken.

Mr. WHITE. You can pick up a station which is sending, but you have no means of checking up a station which is receiving?

Capt. TODD. None at all without the license system, which the present law does not provide for at all. Anybody, not only amateurs and Americans, but any foreigner can put up a station and not be questioned.

Mr. BOWERS. You can establish a penalty there, but how are you going to enforce it; how are you going to tell as a practical thing whether they are doing it or not?

Capt. TODD. You would have to judge from results. If there is a leak of information of a private nature, we would have to trace it down and find out where it came from. If the Associated Press collects news in foreign lands at great expense and tries to transmit it from a high-powered station, we will say, to somewhere outside the country, and that news is suddenly published in a local paper, somebody connected with the Associated Press would immediately demand an investigation, and we would look for the illicit radio station.

STATEMENT OF LIEUT. J. C. COOPER, JR., UNITED STATES NAVAL RESERVE FORCE.

Lieut. COOPER. Gentlemen, I am an ex-amateur radio operator and "amateur naval officer," as I am soon going back to civil life to take up the practice of my profession again. As many other amateurs, when the war broke out, I offered to do what I could for the service, and have had some duties in connection with radio work which have given me an opportunity, I hope, to be able to see the point of view of the Navy and the point of view of the amateur operator to some extent at the same time.

Several days ago there was a meeting called in Capt. Todd's office—without knowing how many men would be present—of all of the ex-amateurs who happened to be on duty in the naval service in Washington. There were about 25 or 30 men present. The question of the operation of amateur stations after the war was very liberally discussed, and a memorandum was prepared and sent to each of those men and any other men in the naval service in Washington who had been amateurs that we could locate, with the request that the questions be answered and sent back as soon as possible, with an idea of

drafting an amendment to the present law which would, as far as possible, meet the combined view of themselves as previous amateurs, knowing amateur operations and knowing what the amateur desires to do and what he has done, and also with their experience since the war as part of the Government's service that has controlled radio. I had the unfortunate responsibility of having to say the final word on collating those opinions and putting them into the form of an amendment. There is no body of men, I believe, who disagree more violently among themselves on every subject that concerns them than do the amateur radio operators. I am convinced that from now on, as these hearings are going to be printed, my name is going down in radio history among the amateurs to some as guilty of high treason, to others as being foolish, to others as deserving some credit if this amendment goes into law. I do not expect all the amateurs to agree with it at all. It is the collective judgment, however, of a certain number of amateurs who have seen both the Navy point of view and the amateur point of view, and I, myself, with the approval of the department, and it is offered as an amendment to the bill.

The present law states that the amateur who does not hold a special license is authorized within 5 miles of a Government station to use a transformer input of one-half kilowatt, elsewhere 1 kilowatt, and to use a maximum wave length of 200 meters. All amateurs are agreed that you can not properly tune an efficient amateur station quite as low as 200 meters; that an extension in wave length is desirable. The consensus of opinion of those I have talked to is that the limitations of this amendment—that is, not to exceed 250 meters—will greatly increase the efficiency of amateur stations and will enable the amateur to further fulfill his real function, which is to train him as an operator for any national emergency that may arise, and to possibly train him as a further developer of the ratio art. The amateur has no place in the scheme of things if he is not useful. The ether is a means of communication which must be put to the use of the community as a whole for the advancement of the community. Unless the amateur operator advances the art, or advances the community, the amateur has no right to exist. I, personally, as a naval officer, have had many operators under me. I have found that of the new men under me the easiest trained, the most adaptable to the new apparatus, and the most efficient men I had were ex-amateur operators.

I took two of my best men the other day and put them on the President's ship to receive official messages from Washington. They were both ex-amateur operators; and I think that I speak for Capt. Todd and the Navy when I say that no one more than the Navy realizes the value that the amateur operator was to the Navy when the war first broke out. I, personally, of course am prejudiced in favor of the amateur, because I am praising myself when I praise the amateur, because I am an amateur operator.

This amendment also licenses receiving stations without requiring a license of the operator. In other words, the jeweler who has a receiving station simply for the purpose of receiving the Arlington time signals and checking up his chronometer will not require to be a radio operator to operate his receiving station. Likewise, the amateur who is only learning to send, who is just starting, will not have to have any license in order to operate a receiving station. We do

not think, on the other hand, that any amateur ought to have a right to touch the key and to cause possible blundering interference by his lack of ability as an operator unless he can receive and send what is usually called 15 words per minute; that is, 75 letters per minute, in the ordinary standard of 5 letters to the word, which is what we use in averaging an operator's speed. I personally do not think that that limit is too high. Others may disagree with me. I personally think that no operator ought to touch a key and ought to be allowed to interfere with this medium of commerce, which is the ether, unless he has that degree of skill. If he is required to have that degree of skill, it will be an incentive to him when he is first learning the art to get up to that degree of skill as soon as he can, so that he can have a transmitting license.

This amendment includes a clause authorizing the Government, where it is found expedient—as, for instance, in large centers or elsewhere—to limit the transformer input of amateur stations to one-half kilowatt if within 100 miles of the seacoast or within 5 miles of a Government receiving station to one-fourth kilowatt. I am frank to say that those powers are higher than the consensus of opinion of these written documents from which I compiled the amendment. Those powers are more liberal than the great majority of the men who compiled these memorandums thought proper, but after talking with Capt. Todd and Commander Hooper, and with especially this idea in view, namely, that there are many amateur stations which will have to apply for license before they can again reopen, who, if the input is cut down very much from the present law, will be required to remodel a part of their apparatus or give up their apparatus if we change the power limits very much. Personally, I think that those limits are as reasonable as can be safe from the point of view of noninterference with the real business of radio, which is sending official and commercial dispatches, and that those powers are ample to provide full experimentation that an amateur ought to have occasion to do and all communication that he may have occasion to make. Mark me, it does not say that a license can not be issued up to 1 kilowatt under those limitations. It says that the Government may in its discretion put those limits on.

For example, we will take on the peninsular of Michigan or on parts of the more or less uninhabited coasts of the Gulf, there is no reason why there would be stations near enough or ships working near enough so that 1 kilowatt would necessarily cause interference by what we call “forced oscillation.” The amendment leaves it in the discretion of the licensing power to cut down to those limitations amateur stations which are near the centers of commerce, where other stations are using radio for its real purpose, and still it allows the amateur to work.

There are a lot of amateur operators here, some of whom I have known personally; some I have met since I have been here to-day; some I have had correspondence with before the war. A lot of them are going to disagree with me; some of them are going to think these limitations too low, and some are going to think these limitations too high. That will be for the committee to decide. This is submitted by the Navy as a measure to assist in the future development of amateur radio.

I want to say a few words about the high-power stations at the present time, so far as the actual operation is concerned, and before I do so, if anyone wants to ask me anything about the amateur, I will answer before proceeding with the high-power stations.

Mr. SAUNDERS. I want to ask you a few questions about the amateur before you get on the subject of high-power stations. You have read the bill that is under consideration by the committee?

Lieut. COOPER. I have read it, sir.

Mr. SAUNDERS. Aside from your amendment you have been discussing, there is no provision in the bill whatever relating to amateurs, is there?

Lieut. COOPER. I understand, sir, it was the intention of the department to license amateur operators.

Mr. SAUNDERS. Under the bill that has been introduced there is no provision for the amateur?

Lieut. COOPER. Not under the name "amateur."

Mr. SAUNDERS. Is there under any other name?

Lieut. COOPER. I think, sir, there would have been no reason why amateur stations should not have been licensed under the term "experimental stations."

Mr. SAUNDERS. Suppose it is just a single individual. I understand a great many of these people who are amateurs took up this thing before the war—just young men who took up the business themselves?

Lieut. COOPER. I did so myself.

Mr. SAUNDERS. That would not be called a station, would it?

Lieut. COOPER. Oh, yes, sir.

Mr. SAUNDERS. Do you think, under the language "experimental stations," that any little individual amateur operator in the wilds of my district, I will say, who has been working on the thing himself as an intellectual improvement, could be described as "experimental station"?

Lieut. COOPER. I think so. But I say it is a moot point in view of the amendment.

Mr. SAUNDERS. I do not see how that could be done with respect to the provision as to who is to be licensed as an amateur. Under that, necessarily, before any man could start out as an amateur, he must have had the opportunity to take some training at some school.

Lieut. COOPER. Very frankly I think that very few amateurs ever went to a training school.

Mr. SAUNDERS. You require them to possess certain capacities by your amendment; they have got to have a certain facility.

Lieut. COOPER. The amateur can learn that by using the buzzer. All amateurs do the same thing, all operators.

Mr. SAUNDERS. Can he experiment enough with the wireless apparatus to acquire that facility without having a trainer?

Lieut. COOPER. May I suggest, sir, that the process would be something like this: That by listening in, as we call it—and you will note that no license is required for receiving—a man can become accustomed to using the receiving apparatus, and he can become accustomed to the sending with a key hitched to a little buzzer, which is not a radio operator, and he can be taught to send up to any speed he can ever attain.

Mr. SAUNDERS. He can teach himself, in other words, can he?

Lieut. COOPER. Teach himself, or be taught by other amateurs.

Mr. SAUNDERS. He can pick that up by his own efforts, and by his own ingenuity and application at home and can acquire the facility which you have imposed upon him before he can receive a license?

Lieut. COOPER. I think any of the amateurs here will agree with me on that.

Mr. SAUNDERS. With respect to this amateur, after he has attained that speed, and then is given the license that you contemplate, all of his operations would be controlled by the terms of his license?

Lieut. COOPER. They are at present, under the present law.

Mr. SAUNDERS. Do you contemplate any difficulty in that connection if he operates according to the terms of his license, with the commercial operation of the Government system, or any other commercial system?

Lieut. COOPER. The limitation of wave lengths, sir, and the limitations of power in the present law of 1912, as amended by this amendment, are designed to prevent the amateur from causing interference with commercial stations.

Mr. SAUNDERS. But you can see no danger of interference with the wireless system in the hands of private enterprise or Government control?

Lieut. COOPER. It was my view, sir, in drafting the amendment as it is, that these limitations on power and wave lengths would prevent such interference.

Mr. SAUNDERS. So that in considering the general problem with respect to the necessity of having this entire business under Government ownership and control, we can eliminate any factor of danger from amateur operators?

Lieut. COOPER. I think so, sir, with the exception of the fact that adequate inspection of amateur stations must be had in the future if the amateur is to maintain the dignified position in the radio world that he should.

Mr. SAUNDERS. That is by regulation?

Lieut. COOPER. Yes, sir.

Mr. SAUNDERS. As I said, you eliminate the amateur experimentors as a factor in determining this policy, because they will operate in a field outside of the field that this policy is designed to control?

Lieut. COOPER. That is the idea of the amendment.

Mr. SAUNDERS. Can you not provide us with copies of that amendment?

Lieut. COOPER. These copies are being made, and will be here to-morrow morning.

There is one coming factor in radio work which may adversely affect amateur operating which should be looked forward to at the present time. The fleet—and this is not disclosing military secrets—is using for intercommunicating purposes very short wave length, shorter than the one hundred fifty meters mentioned here as the minimum length that an amateur should use. Aircraft are also using various wave lengths, some of which are almost down to 250 meters. There may be trouble in the future, sir, between aircraft operating overland and working with their receiving or transmitting stations,

and amateur stations. That is a possibility of the future that I will call the attention of the committee to at this time, because this thing may come up here at another time under some future law, and I simply want to warn the committee that this is a new field that we know nothing about. Aircraft radio as not in existence to any extent when amateurs last operated. There may be interference between amateur operators and aircraft radio stations, but it is hoped that there will not be.

Mr. SAUNDERS. Government ownership has nothing to do with that problem?

Lieut. COOPER. Except the Government would probably be operating the stations for aircraft.

Mr. SAUNDERS. The possibility which you speak of which may arise hereafter is a thing that will be met by appropriate regulations, is it not?

Lieut. COOPER. It might be, sir, if this amendment is passed, that it might have to be met by legislation again reducing the wave length back to where it is now.

Mr. SAUNDERS. Appropriate legislation?

Lieut. COOPER. It might be legislation and not regulation.

Mr. SAUNDERS. Legislation is just that much more authoritative than regulation.

Lieut. COOPER. I usually think of "regulation" as a regulation of a department.

Mr. SAUNDERS. I admit that is so in general, where you think of something issued by some department head or some Bureau Chief.

Lieut. COOPER. Are there any other questions? If not, I want to say just a few words about the high-power stations in this country at the present time.

There are present representatives of the principal radio companies in this country. With all due respect to them and with all due respect to other experts, I wish to say that since the war the Navy Department has had more experience in handling high-power radio traffic, and is therefore in a better position from a practical operating basis to say what can and what could be done than anybody else. The high-power traffic existing before the war commercially was one circuit from Hawaii into California, operated by the Federal Co.; another circuit from California into Hawaii, operated by the Marconi Co.; the Marconi circuit from Hawaii in connection with the station of the Imperial Japanese Government at Funabashia. The only high-power stations constructed in the world in the last three years by other than Government agencies have been the stations on American soil, and the station at Carnarvon, Wales, constructed by the British Marconi Co., and in which so-called time-spark apparatus is installed.

No trans-Atlantic radio traffic between the United States and Europe has ever been handled except the German traffic between Sayville and Nauen and between Tuckerton and Eilvese.

The only commercial radio traffic with Great Britain from this continent was a circuit operated from the Newfoundland station by the Canadian Marconi Co. with the corresponding station at Clifden, owned by the British Marconi Co. No commercial concern has ever faced the problem that the United States Government has faced in handling trans-Atlantic radio communications; that is, joint and

simultaneous radio traffic between the United States on the one hand, France, Italy, and England on the other. The Navy has handled that traffic and is doing it.

There has been developed a system of operation which has been maintained as a military secret, which has recently been made more or less public, and which Capt. Todd has authorized me to explain to you gentlemen.

The four high-power stations on the Atlantic coast now in operation—the naval station at Annapolis, Md., the station at Sayville, the station at Tuckerton, N. J., the station at New Brunswick, N. J.—are all operated by keys located in my office in the Navy Department. Four operators sit at the four small tables in one room. The pressure of a key on one of those tables operates, by means of relay, the actual sending station at Annapolis; another key operates the station at New Brunswick; another key operates the station at Sayville; and another the station at Tuckerton. No receiving is done at any of those stations. When we commenced to develop this trans-Atlantic system, in response to very urgent requests, and, in fact, insistence of Gen. Pershing that adequate steps be taken immediately to substitute the cables, in case they were cut by German submarines or other enemy activities, the Navy Department used first the two receiving stations constructed, but never used for that purpose, by the Marconi Co., one at Belmar, N. J., which was to have been the receiving station for the New Brunswick station, and the one at Chatham, Mass., which was to have been the receiving station for the Marion station. It was early found, sir, that the physical locality of neither one of those stations was all that was to be desired. The Navy constructed a receiving station of its own at a place called Otter Cliffs, not far from Bar Harbor, on the point of Mount Desert Island. That station and the Belmar station also—the Chatham station we have since turned back to the Marconi Co. and closed—those two stations are equipped so that they can receive simultaneously from each of the high-power trans-Atlantic stations in Europe. Radiograms can be received simultaneously from Carnovan in England, from Nauen in Germany, because we find it of great interest to copy everything that Nauen has to say; Lyon, the high-power station of the French Army in France; Nantes, the high-power station of the French Navy; and Rome, which is the high-power station erected last year by the Italian Navy. In addition to that, we can receive two or three other stations, if necessary, at the same time. As a matter of fact, we at the Otter Cliffs station are receiving messages from the Pennsylvania, relayed from the President's ship, and also other experiment schedules are maintained as well as our regular trans-Atlantic traffic.

Mr. SAUNDERS (presiding). You mean the different operators receive at the same time, or one operator?

Lieut. COOPER. I mean different operators. The stations are duplex stations. That is not a proper word, because "duplex" from its proper derivation means "double." The stations are multiple receiving stations; that is, they can receive from a large number of transatlantic stations at the same time.

What is the economy of operation in this scheme, and what advantage has it over any other scheme of transatlantic radio traffic? Absolute unity of control.

I venture to suggest, sir, that if you do not pass this bill now there will be many of you still in the service in Congress when you will pass this bill. The Government control of high-power radio traffic from the economic standpoint of the maximum amount of business to be handled is bound to come.

Mr. GREENE. That is an opinion.

Lieut. COOPER. That is my opinion, sir.

Mr. SAUNDERS. You say that is what you call a duplex receiving station.

Lieut. COOPER. Yes, sir. A multiple receiving station.

Mr. SAUNDERS. Tell me what is required for a duplex station. Can not all these other stations receive anything?

Lieut. COOPER. They can, sir. But I am trying to explain to you how this operates as a whole. Let us consider that the Tuckerton station goes back to its owners, whoever the courts determine that its owners may be, either a French corporation or a German-controlled corporation; the Tuckerton station, whoever owns it, will erect a receiving station to receive from the station that they happen to be working with in Europe. The New Brunswick station, if turned back to the American Marconi Co., will operate a separate receiving station and will operate that station as a part of a separate circuit. What occurs? In case at the present time any one transmitting station breaks down here is a message that the operator has got on his desk [illustrating with piece of paper]. It is passed over to the next desk and sent. That can always be done if this present Government system is maintained.

Mr. SAUNDERS. That means three or four sending stations under your control?

Lieut. COOPER. Yes, sir.

Mr. SAUNDERS. And if one breaks down, it is turned over to the next?

Lieut. COOPER. Yes, sir.

Mr. SAUNDERS. Suppose a commercial private enterprise has one, two, three, or four sending stations, do they not send from one of those stations, like the telegraph?

Lieut. COOPER. Here is the situation, sir: On account of the actual physical limitations of radio traffic the maximum number of high-power stations which can be operated at one time is undoubtedly limited. I personally believe that the number now in operation on the Atlantic coast is getting very close to the practical limit of continuous operation, because in order for them to be of their best use to the community they must all be used at one time. Now, suppose these stations are all operated by separate concerns. In case of any breakdown you are just losing that much traffic which could be handled for the benefit of the community; that is the point I was trying to make, sir.

If all of these stations are handled on separate circuits you have not the same flexible control; you have not the same flexible handling of your traffic and you have not the same direct control over the wave length and operation of the stations that you would have with the uniform control.

Mr. SAUNDERS. Now let me work that out a little and see if the committee understands it: The Government, we will say, has a send-

ing station at Long Island, and a sending station at Annapolis, and one at Washington.

Lieut. COOPER. Yes, sir.

Mr. SAUNDERS. Now, I understand that if a message commercially is offered to the station here at Washington, and that station happens to be out of repair, they would just turn it over to the sending station at Annapolis; that is what you contemplate, is it?

Lieut. COOPER. You do not quite get me. We really have one control room, one physical room.

Mr. SAUNDERS. But the effect of that is that you turn the message over to that other station?

Lieut. COOPER. But that is a sending station—

Mr. SAUNDERS (interposing). Well, that is a matter of detail. But the fact is that you turn it over to that station?

Lieut. COOPER. Yes.

Mr. SAUNDERS. Now, if you turn it over to that station, and furnish those facilities to the public, they can have a control room too, can they not?

Lieut. COOPER. But with no other means than the control of all of the stations operating together.

Mr. SAUNDERS. All of their own stations, of course?

Lieut. COOPER. That is exactly it, sir.

Mr. SAUNDERS. Well, the Government only controls the Government sending station, does it not?

Lieut. COOPER. You can not handle as much traffic if you have a large number of concerns controlling that traffic as you can handle if you have only one concern controlling all of the stations that are handling the traffic; and I believe that the traffic experts—

Mr. SAUNDERS (interposing). Well, that is another proposition.

Lieut. COOPER (continuing). I believe that all of the traffic experts will agree with me on that.

Mr. EDMONDS. That seems to be a familiar argument; it is like the one they use about the railroads.

Mr. SAUNDERS. You can not lay that down as a scientific proposition, can you, Lieutenant?

Mr. EDMONDS. He states that the ether waves are pretty well taken up. I understand that you can run these wave lengths up to 25,000 meters, or more?

Lieut. COOPER. The longest wave length in use at the present time is about 17,000 meters; and if there is any single hole in the ether, up to 17,000 meters, it can not be found.

Mr. EDMONDS. Well, is there such a condition that a difference of only 200 meters between stations will prevent them from operating at the same time?

Lieut. COOPER. Absolutely.

Mr. EDMONDS. What is the nearest to each other that you can have them, in wave lengths?

Lieut. COOPER. It depends on the type of transmitter, as well as the ability of the operator and the type of receiving apparatus. Certain operators can read a weaker signal, while reading another station, just on account of their own mental make-up. But, so far as the actual present traffic is concerned, I can give you the actual wave lengths in use, and as I explained, I do not think there are any

holes in the ether where any other wave length can be used in the present high-power stations. Beginning pretty well along down the list, the station at Tuckerton is using about 8,900 meters. The station at Nantes in France is using 9,000, on some of its schedules, on low power. They interfere with each other.

Mr. EDMONDS. You say they do interfere with each other?

Lieut. COOPER. Yes; one is French and the other is American. The regular station wave is 10,000 meters for trans-Atlantic traffic. The station at Sayville is using 9,600 meters.

Mr. EDMONDS. Does that interfere with the one at Tuckerton?

Lieut. COOPER. No; these that I have given are being operated simultaneously without interference.

Mr. EDMONDS. Then a difference of about 400 meters in the wave length would allow the message to go through all right, would it?

Lieut. COOPER. A difference of 500 to 750, if it is a very sharply tuned high-power station, would. Certain types of stations can not be used anywhere near that sharp. The station at Carnavon, working at 14,000 meters, on account of what we call certain harmonics, prevents the reception in London of messages at about 11,500; that is on account of the different types of transmitters in use. I am talking about the sharply tuned stations.

Mr. EDMONDS. Well, is it not the modern idea to have sharply tuned stations?

Lieut. COOPER. Exactly; and our claim is that the stations of the Navy are the most sharply tuned ones.

Mr. EDMONDS. Well, can not the other people have them, too?

Lieut. COOPER. They can have them, but they have not put them in up to the present time.

Mr. SAUNDERS. What do you mean by "holes in the ether?" [Laughter.]

Mr. EDMONDS. That is one of those things that aeroplanes drop into. [Laughter.]

Mr. SAUNDERS. I have heard that phrase before, and I was curious to know what it meant.

Lieut. COOPER. It is a slang expression which I should have not used to the committee.

Mr. SAUNDERS. Do I understand correctly that it is an oscillation in the power of the instrument?

Lieut. COOPER. What I mean by "holes in the ether" is that I do not think there are any spaces existing between wave length now in operation where other wave lengths could be placed.

For instance, last year the station at Carnavon was working on 14,000 and about 100 or 200 meters. Nauen station in Germany was working on 12,600 meters. It appeared perfectly plain that there was a space in between there where another trans-Atlantic station could be used. New Brunswick station was therefore turned for 13,600 meters and operates on that wave length.

Mr. WHITE. How long have you been connected with the Navy Department, Lieut. Cooper?

Lieut. COOPER. Since May 17, 1917.

Mr. WHITE. And have you been employed all that time in connection with radio activities?

Lieut. COOPER. I was assistant to the district communication superintendent in the Charleston radio service until September 1, 1917.

I was ordered to Washington for duty, in the office of the Director of Naval Communications at that time; and it has been my good fortune to be there ever since—except that, personally, I would have liked some foreign duty, but have not been able to get it.

Mr. WHITE. How long had you been a wireless operator or student before your connection with the Navy?

Lieut. COOPER. The first radio book that I remember reading was in 1902.

Mr. WHITE. So that you have been a wireless operator or student since 1902?

Lieut. COOPER. I took a special course in mathematics and physics in college and was more or less familiar with radio telegraphy as a student.

Mr. SAUNDERS. Well, as I understand, the scientific conclusion that you state is that, in this field, practically, they have exhausted all these possible wave lengths that may be efficiently and commercially used?

Lieut. COOPER. Unless some stations now in actual use are made to behave themselves very much better than they are now doing, by very much more efficient tuning—and I am not referring to the American stations now.

Mr. SAUNDERS. There is a limit, then, on the possible development—that is the statement, that you have exhausted the feasible wave lengths?

Lieut. COOPER (interposing). No, sir. I say, with the present development.

Mr. SAUNDERS. Then, all that you mean is that, so far as the present state of the science is concerned, you can not use any other wave lengths?

Lieut. COOPER. That is exactly what I mean.

Mr. EDMONDS. You can go higher than 17,000 meters, can you not?

Lieut. COOPER. You can, by building new stations. You can not tune a station higher than a certain wave length and still get an efficient operation of that station.

For example, the antennae of a certain size has a certain natural wave length, that is, that antennae of itself oscillates at a certain wave length. Now, you can not tune that station very many times beyond that natural wave length and still get a sufficient output, compared to the amount of money you are paying for power coming in. Theoretically, you could tune an amateur station to 100,000 meters, but you would get no radiation that would be efficient; and the same is true of high-power stations.

Mr. EDMONDS. But as the demand comes on for higher power stations, they would tune those stations up to very much higher wave lengths as necessary, would they not?

Lieut. COOPER. What we are going to collide with in the operating and development of wireless, when we get into excessive wave lengths—I do not believe any gentleman here can answer as to that, as to what the maximum wave length is that is going to be practicable in the future for radio operation. I do not think that anybody can answer that question. Do you think anybody can, Commander Hooper?

Commander HOOPER. No; I do not.

Mr. SAUNDERS. Well, having in mind that this is an open field, and that the possibilities of development exist, every possible stimulus ought to be given for the inquiring, scientific mind to open up new wave lengths that can be efficiently and commercially operated.

Lieut. COOPER. I think so, sir; but I frankly believe that Government control of radio telegraphy will not act as a damper upon the scientific development of the art.

Mr. SAUNDERS. Are you prepared to say that, in your judgment, you think it would be effective in aid of it?

Lieut. COOPER. I will say that Commander Hooper is especially qualified to speak on that point when he makes his statement. I think that what is true of the past would be true of the future; that is the only answer that you can make to a question of that kind.

Mr. SAUNDERS. Does that mean that up to the present time the main developments in this field have been made through the Navy experimenters?

Lieut. COOPER. I beg your pardon. I was going to finish my sentence. The Navy Department has in the past been in advance of commercial companies in installing up-to-date apparatus in its stations.

And what has been true in the past there is no reason why it should not be true in the future—and it will undoubtedly be true, because the Navy desires the best apparatus that it can have, to give the most efficient service that it can give.

Also, a Government institution, not being bound by the purely commercial outlook, is at liberty, for the purpose of obtaining more efficiency, to take out of its stations obsolete apparatus and install new apparatus, when a commercial company could not do so, because the obsolete apparatus might not have been there long enough to have paid for itself.

Mr. SAUNDERS. As I understand your answer to my question, you said that the Navy was ahead of commercial companies with respect to the installation of big apparatus. Do you also mean to say that the Navy experts and inventors have been responsible for the development of that art by devising new apparatus, etc., or has that come from the outside?

Lieut. COOPER. As I said, Commander Hooper is more familiar with that than I am; but my own opinion is that the Navy has adopted, as rapidly as was consistent with proof of its worth, the best apparatus that was developed by outside inventors, and has also contributed its honorable part in the development of the science.

Mr. EDMONDS. Lieut. Cooper made a statement there that is positively true—that the Navy does not have to exercise any care as to how much money it spends. [Laughter.]

And, on the other hand, a private company has to do so. Then on top of that they do not have to worry about patents; they simply give orders and take all of them they want and do what they please with them, whereas the private company would have to pay for the patents they used. Therefore the Navy should develop very rapidly and should be in the lead in the science to-day. [Laughter.]

Lieut. COOPER. I can not help answering you as a lawyer. I am a lawyer by profession. Congress has provided the Court of Claims to meet exigencies of that kind.

Mr. EDMONDS. Has the court met yet? [Laughter.] I happen to be on the Claims Committee of the House, and I know what happens, and I am very sorry for any man that gets there.

Mr. GREENE. I have had some claims before it, and I have never been able to get anything from it.

Lieut. COOPER. Well, the Navy is not responsible for other bodies created by Congress.

Mr. SAUNDERS. Are there any other questions that any member of the committee desires to ask the witness?

If not, the committee will ask Capt. Todd to put on his next witness.

Capt. TODD. May I ask that a recess be taken until to-morrow morning, Mr. Chairman?

(Thereupon, at 5 o'clock p. m., the committee adjourned until Friday, December 13, 1918, at 10 o'clock a. m.)

COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,
HOUSE OF REPRESENTATIVES,
Washington, D. C., December 13, 1918.

The committee met, pursuant to adjournment, at 10 o'clock a. m., Hon. Joshua W. Alexander presiding.

Mr. EDMONDS. Mr. Chairman, before the committee proceeds with the next witness I should like to ask Capt. Todd a few questions.

The CHAIRMAN. Very well. Before Capt. Todd proceeds I should like to make this statement. The amendment in which the amateurs seem to be interested is being mimeographed, and copies of it will be available shortly for distribution. I make this statement for the information of some gentlemen who inquired about it a little while ago.

STATEMENT OF CAPT. DAVID W. TODD, U. S. NAVY—Resumed.

Mr. EDMONDS. Capt. Todd, the Secretary yesterday spoke of erecting wireless stations in Panama and Cuba. Were those stations erected by the Panama Government and the Cuban Government?

Capt. TODD. In the case of Cuba they were erected by the Cuban Government. We simply got the material for them, as they would have had difficulty in obtaining them in war time. The radio stations in Cuba were, in this particular juncture, of very great military value, because we were expecting submarine operations in the Gulf of Mexico.

The stations in Panama, however, are being erected by the United States Government, in accordance with an agreement with the Government of Panama. The defense of the Canal Zone is so intimately tied up with the radio stations, and the stations in the Canal Zone must be so absolutely free from interference that we persuaded the Panama Government to agree that they would not put up any stations of their own in their Republic. They protested and said "That would interfere with our development." We said "We understand that, and we are not going to shut you out altogether, and such stations as are necessary, by mutual agreement between the two coun-

tries, for the commercial development of Panama, or for the safety of our ships, or the shipping approaching the Canal Zone, we will erect and operate for you, so that you will get everything you want, and the defense of the Canal Zone will not be imperiled."

MR. EDMONDS. Then they are owned in Panama by our Government?

Capt. TODD. Yes, sir.

MR. EDMONDS. Outright?

Capt. TODD. Yes, sir.

MR. EDMONDS. In Cuba you did not lend any money to erect the stations?

Capt. TODD. Not that I know of, sir.

MR. EDMONDS. Have you approached any other South American country with the idea of erecting wireless stations?

Capt. TODD. None, excepting possibly Brazil. When she was our strong ally during this war we did offer to send a receiver down there with our operators. We did not care to let one of the latest receivers, built under the pressure of war, go down there to be examined by anybody that might come along, so we offered to send a receiver down there with our operators to manage it, in order that they might receive from the United States as much as they needed for war purposes. But, if I am not mistaken, nothing was done about it, because the armistice was signed before the plan was carried out.

MR. EDMONDS. Have you not approached different South American countries with the proposition that you would erect wireless stations there and supply the money for doing so?

Capt. TODD. I believe not, sir.

MR. EDMONDS. Or that you would lend the money to do so?

Capt. TODD. I believe not, sir. I do not think that was ever actually done.

MR. EDMONDS. You had that in your mind, though? The department had it in its mind to do so?

Capt. TODD. I won't say that, sir. That idea was discussed, because in connection with the Pan American wireless matter that the Secretary of the Navy touched on yesterday—

MR. EDMONDS (interposing). You were not approaching it through the Pan American Wireless Co. at all; you were approaching it directly yourself?

Capt. TODD. I was speaking about the Pan-American wireless scheme. We had a Pan-American radio congress, and urged them to own and operate their own stations for the mutual benefit of the two Americas, for closer commercial union, and for possible military use in case of encroachment.

MR. EDMONDS. You have not offered financial assistance to any of these countries?

Capt. TODD. Not that I know of.

MR. EDMONDS. To lend them money for the purpose of building a Government wireless?

Capt. TODD. Not that I know of. In connection with the discussion of the Pan-American scheme it was suggested that many of the countries of South America who were interested in the scheme would not be in a position to erect stations of their own and would be dependent upon foreign capital, foreign apparatus, and so on. I have

heard it suggested that one way to do that would be to encourage strictly American companies to do it, or to lend them the necessary financial assistance to put up their own stations, so they would not be dependent on foreign capital—meaning European.

Mr. EDMONDS. But that has not really been carried out?

Capt. TODD. No, sir; not so far as I know.

Mr. HUMPHREYS. When was this Pan-American congress held.

Capt. TODD. About three years ago, sir.

Mr. HUMPHREYS. Whereabouts?

Capt. TODD. In Washington, under the auspices of the State Department.

Mr. WHITE. Captain, you spoke of sending one of your men down there with one of these latest receivers in order to prevent anybody inspecting it. Was that receiver something that was developed and perfected by the Navy Department, or was it something you got when you took over these private companies?

Capt. TODD. I would rather Commander Hooper would answer that question. I will say I am pretty sure it is a combination of all the latest ideas, the very highest type of long-distance receiver in the world.

Mr. WHITE. Yes; but what I wanted to get at was whether it was something evolved by the naval officers or whether it was something the department got from outside and private concerns which the department took over.

Capt. TODD. As far as I know, the department did not take over any private concerns, sir. We have been buying our radio apparatus from the manufacturers of the country. That is just something I have heard; I do not know definitely, and Commander Hooper will be able to answer that question with great exactness.

Mr. EDMONDS. In regard to the offer of money to assist these other Governments you say, "Not that I know of." Would there be anybody else that would know if it were being done?

Capt. TODD. The State Department; yes, sir. That would be a State Department matter. All correspondence with those South American countries is conducted by the State Department, but it is highly probable I would know about it.

Mr. EDMONDS. I should imagine you would. If you find any different, will you let us know?

Capt. TODD. Yes; I will.

Mr. EDMONDS. Will you take the trouble to make the inquiry?

Capt. TODD. Yes, sir; I will.

The CHAIRMAN. Captain, you would not appear here in the position of an apologist to the American people for the Navy Department if any such policy as that were in view, would you?

Capt. TODD. I would probably hear of it; yes, sir.

The CHAIRMAN. I say, you would not put yourself in the attitude of a criminal doing something against the public interest if you had tried to make such arrangements between the United States and South America, for the establishment of a system of wireless for use in time of peace for commercial purposes, and in time of war for the national defense, would you?

Capt. TODD. No, sir. All those things would be strictly in line with my duties.

The CHAIRMAN. Very well. Then you would not feel any hesitation about disclosing to this committee and to Congress if that was a fact, would you?

Capt. TODD. Only from the point of view that these are negotiations of the State Department which I could not make public.

The CHAIRMAN. I can very well understand why some special interest might object, or some European interest, but I can not understand why the red blood of America should. I simply wanted to explain my view of the matter.

Capt. TODD. I should hesitate to make public in this way that the State Department is doing, even though I had had a hand in the correspondence in connection therewith. I had hoped and still hope that one of the higher officers of the State Department will appear in support of this bill to-day.

Mr. EDMONDS. I do not think personally that there is anything criminal in the matter.

The CHAIRMAN. I think that is an inference from your question, that you thought it was some scheme against the public interest.

Mr. EDMONDS. I am merely trying to bring out the fact that the Navy Department has originated a new policy without the consent of Congress. That policy should be known by Congress, and if we want to consent to it we should, and if not we should not allow the policy to be extended any further. The matter of lending several hundred thousand dollars to different South American countries is a matter for Congress to decide, not the Navy Department.

The CHAIRMAN. Well, there is not a dollar of money appropriated by Congress unless it is made under its authority and carrying out some policy. I do not know how far the Navy Department has gone, because these questions of appropriations come up before the Committee on Appropriations and the Committee on Naval Affairs primarily, but I would think it a desirable policy just the same, speaking from a personal viewpoint. As to whether those extensions should be controlled by the Navy Department, that is secondary, but as a national policy I should think it would be of importance, because that is what the European governments have done and continue to do. The question is whether we will recognize our national interests and protect them.

Mr. BANKHEAD. I would like to ask this for my personal information, Mr. Chairman. Something was said yesterday about the probable cost to the Government of requisitioning all these other plants that are proposed to be taken over; was that discussed in any way yesterday?

Mr. EDMONDS. The Navy Department has purchased the Federal wireless and the Marconi wireless stations at a cost of about \$3,000,000; I think that is about the round figures. Secretary Daniels stated that it would cost about \$5,000,000, in round figures, to purchase these stations that they are talking about in this bill. That has nothing to do with these South American stations.

As to the South American question, of course, if the Government is intending to commit itself to the policy of Government-owned wireless, then the question of having stations at different points is a part of that policy, and what I am trying to bring out now is whether the Government has committed itself. We are sitting here

objecting to Germany and other countries having wireless in our country, and that same objection is just as good in some of these other countries, and there are international complications which we have to take into consideration when we discuss this bill, because these wireless stations are absolutely useless unless we have somebody to talk to.

Mr. BANKHEAD. I understand your attitude. My question was just for personal information.

Mr. EDMONDS. This was the physical valuation that Mr. Daniels put on these properties—about \$5,000,000. That was in the testimony yesterday. Outside of that is the question of patent rights, which, of course, become valueless in this country when there is only one person to purchase them, or become considerably depreciated in value. All of those patent rights are in litigation, and I think when Commander Hooper appears to-day we will probably get some light on the patent situation.

I said yesterday that we had before this committee a Government ownership bill which we had decided to lay aside, and yet at the same time the Navy Department has gone ahead and embarked us on the policy of Government ownership, and the question is whether we are going to go all the way or let it stand where it is.

The CHAIRMAN. I can not see any ground for your statement that the Navy Department, notwithstanding the Government ownership bill, has gone ahead and committed itself to a policy, because ever since wireless was first developed the Government has built up naval wireless stations, and they have the greatest plant in the world, Government owned and controlled. So it is not the beginning of the policy; it is a continuation of a policy that is decades old. The question is how far we shall extend it; that is all.

Mr. EDMONDS. Mr. Chairman, they embarked into a commercial competitive business, and they are going to make a Government monopoly of it. That is exactly what they are trying to do. Before that the Navy Department had wireless for its own use.

The CHAIRMAN. Yes; but now the Marconi people have given up the ship-to-shore stations because they found them unprofitable.

Mr. EDMONDS. As the result of a policy something like the tank motto—"Treat 'em rough." [Laughter.]

The CHAIRMAN. Well, that is not true.

Capt. TODD. No; that is not exactly fair.

The CHAIRMAN. At least, I got a different statement from their attorney. They are very willing to give up their ship-to-shore stations.

Mr. GREENE. After the foundation has been taken away from under them, of course.

Mr. WHITE. But this proposition goes a great deal further than ship to shore.

The CHAIRMAN. I am not prepared to say how far we should go.

Mr. BANKHEAD. It seems to me those are matters of argument for the committee. I did not seek this character of controversy when I asked my question.

Mr. LAZARO. I thought, Mr. Chairman, it was understood yesterday we were to hear the evidence and not argue these questions?

Mr. HARDY. I do not like to hear the continual reiteration of the claim that we have taken up this bill before and rejected it. We

have taken up the bill, but if we have ever had any final committee action on it, I do not know.

Mr. GREENE. It died.

Mr. HARDY. Yes; because it took us weeks to hear what was said.

The CHAIRMAN. It was never considered and reported out at all. My purpose, and only purpose, in consenting that hearings be held on this bill was that the whole question might be presented for the consideration of Congress and the country. That is the only thing I had in view when I consented to set the bill down for hearing, and that is what I am anxious to do. I am anxious to hear every possible angle of this question discussed.

Mr. EDMONDS. That is the reason I wanted to bring out the situation as to South American wireless.

Capt. TODD. On the subject of witnesses, I hope that one of the officers of the State Department will appear and speak in favor of the bill. At the present time there is only one more witness, the technical officer of the Navy Department, who is prepared to go on the stand now. There are a number of men who have no objection to the bill, but are not prepared to speak in favor of it. They represent, technically, the amateur interests; that is, I mean to say they will have no objection to the bill when this mimeographed amendment is passed around. But if there are any others who expect to favor of the bill, I have not heard of them.

With Commander Hooper and this officer from the State Department, the testimony in favor of the bill will be completed. I would ask, however, that toward the end of the proceedings I be permitted to say a few words. There are some amendments to the bill that will clarify the wording, as brought out yesterday, and as will be brought out probably by other witnesses. But I would like to say further that, judged by past experience—this is my third and last appearance before the committee—the opponents of the bill that have come before the committee have made what might be called outrageous statements. I do not mean they have made deliberate misstatements of fact; but radiotelegraphy and everything concerned with it—patents, apparatus, inventions, operation of stations, policy, international matters, personnel, manufacturing, and a thousand and one matters—every feature of it is so full of complications and the facts surrounding it are so intertwined that it is the simplest thing in the world for some one to make a statement that gives it a ridiculous appearance, just as you can pick out of some beautiful picture the figure of a man and paste that on a blank sheet of paper and it will be a caricature.

So, if something should occur to mislead the members of the committee on a subject on which they can not possibly be thoroughly informed, I should like the privilege of making a remark or two, from official records or from experience that I have had, that will qualify me to speak with authority. At the present time the Navy Department is operating the greatest system of radio stations we have ever had in the world, and we can talk with some authority on these things.

Mr. GREENE. Mr. Chairman, I do not think there is any objection to the captain giving us all the light he can give—if you will only give us some light and not hold back.

**STATEMENT OF COMMANDER S. C. HOOPER, UNITED STATES NAVY,
EXECUTIVE OFFICER, RADIO DIVISION, BUREAU OF STEAM
ENGINEERING, NAVY DEPARTMENT.**

Commander HOOPER. Mr. Chairman and gentlemen, I occupy the position of executive officer of the radio division in the Bureau of Steam Engineering, which bureau is charged with the provision and supply of all apparatus for radio purposes of the Navy and such other vessels as have been necessary during the war, the construction of all the shore stations, and their maintenance and upkeep; also the development of the radio, in so far as the department is interested.

My experience in radio has been about 10 years, off and on. I was fleet radio officer of the Atlantic fleet under two commanders in chief. I went abroad to study the general radio situation at the beginning of the war in 1914, on both sides, and since then I have been in the Bureau of Steam Engineering in my present capacity, except during the most of the past year, when I was at sea in command of one of our destroyers. But I have kept in close touch with what the bureau has done, and think I can give an impartial view from our standpoint.

Before going into the general subject, I do not think it would be out of the way that I should pay tribute to the fine cooperation and fine work of the radio manufacturers and inventors and amateurs in our country. When war came on us we were totally unprepared to handle the entire situation. The amateurs saved the day when we had to man practically the entire merchant marine by naval radio operators in order to incorporate the merchant marine into the naval system.

The manufacturers came down to Washington and placed themselves at our disposal, and in every way possible did their utmost to further the plans and slightest desires of the department. The inventors were keen and active in every effort in their research work to produce what might be used against our common enemy. I take particular pains to mention the assistance given by Mr. Nally, vice president and general manager of the Marconi Co., whose company more than anyone else suffered through what war brought upon them; and also of the Federal Telegraph Co., which stood next in being harmed, due to the Government's closing the stations.

These officers have performed a service as great as any military officer in the radio work for the Government in time of war, and this service should be recognized in some way. They know in their consciences that they have done a great good to the country, the same as the soldiers and sailors have done, and it ought to go down in the records of history that they have done their duty.

It has been the same with all the radio manufacturers. They have done their duty to a man. They have borrowed money, they have worked overtime, they have worked until they could not work any longer, in order to fill the needs of the Navy. It is our duty, now that the war is over, to see that they are properly rewarded, and I consider that a brief mention of this fact is not out of place in the hearings before this committee.

I shall endeavor to bring out in my testimony the advantage of Government ownership of radio communication from a technical point of view, dealing principally with the cause of the interferences.

Before I proceed with the interference subject I wish to emphasize one statement made by the Secretary of the Navy yesterday which should be continually borne in mind on this subject. That is that radio, by virtue of the interferences, is a natural monopoly; either the Government must exercise that monopoly by owning the stations or it must place the ownership of these stations in the hands of some one commercial concern and let the Government keep out of it. Otherwise two systems can not effectually operate to the highest efficiency or with absolute safety to navigation and the greatest assistance to ships in distress at all times. It is a high duty that we have in connection with radio. We have to look out for ships at sea, which have no other means of communication with the shore, and in our opinion we should legislate however may be necessary in order that they may be properly protected.

I will discuss first the question of interference, then I will follow that by a short history of what we have done during the war—which will be of interest to the committee—and then the question of patents, which some of the gentlemen are very much worried about, will be discussed.

In the first place, for the benefit of those who are not familiar with the details of interference, I will give an illustration which possibly will make clear the terms "wave length" and "tuning," which should be thoroughly understood in order to understand the requirements which the service must fulfill.

Take a simple illustration, a piano. Each key of a piano makes contact with a metal string, and dependent upon the size and length of that metal string there is a tone produced. If the string or wire is longer or shorter the tone is lower or higher.

That tone might be considered to correspond to a wave length. A high tone, for example, would be a high wave length, and a low tone, for example, a short wave length. Different tones interfere, so that if there were several keys pounded at the same time you could not distinguish one tone clearly from the other; you would have interference. If you were able, through some ingenious means, to distinguish which one of the keys was being drummed upon, you could say that you were able to "tune out" the interference.

I think that illustrates the idea of wave lengths and tuning. If it does not I would like to be questioned further, because I think it is absolutely imperative that you gentlemen understand these terms in order to appreciate our reasons for desiring Government ownership as regards interference.

Understanding what a wave length is, we can say that its length, or tone, depends upon the length of the string or wire of the piano. Similarly, the length of the wave sent out in radio depends upon the length of the antenna which is used in the transmitting station. If we have a very low antenna we send out a very long wave length; if we have a short antenna we send out a very short wave length. Naturally a station that uses short wave lengths will be very much cheaper in construction than one with a long wave length.

THE CHAIRMAN. Speaking of wave lengths, a wave is what?

Commander HOOPER. The length of the wave or oscillation in the ether. The opponents of the bill will undoubtedly endeavor to bring up intricate questions about wave lengths and so on to confuse you, but I assure you, gentlemen, you understand enough now about

the whole thing so that if you do not allow yourselves to be confused by these questions and keep the issue clearly in mind, you can understand the absolute necessity for a monopoly of some sort in radio communication.

Mr. LAZARO. You have compared a wave length to the sound from the string of a piano. Now, what about the receiver? Would you compare that with the ear?

Commander HOOPER. With the ear; yes, sir.

Mr. LAZARO. What difference is there in receivers? For instance, some ears are deaf to these tones from the piano and some are very acute.

Commander HOOPER. We have very acute receivers, sir.

Mr. LAZARO. I know, but in that connection would it not be a good idea to discuss the receiver? We do not know very much about those things, you know.

Commander HOOPER. If you will just imagine that your ear is the receiver, I think that will be perfectly sufficient for the purpose, sir. The receiver is so connected up that if the ear is turned in the proper direction, for example, it will respond to the tone, it will hear the tone. If the receiver is so tuned by having the proper length of wire in series with the aerial it will respond to the incoming signal of the particular wave length which the aerial is set for.

Mr. WHITE. What differences in the wave lengths must there be in order for a skillful operator to pick out the differences and avoid confusion or interference?

Commander HOOPER. I will answer that broadly first, and then in detail. Yesterday it was developed that we used up to about 17,000 meters wave length in our largest stations, and, of course, all the smaller stations, having smaller and shorter aerials, use a less wave length.

Mr. HUMPHREYS. What do you mean by 17,000 meters wave length?

Commander HOOPER. I mean that the formula for a wave length is dependent upon the speed of the transmission of the wave, which is the speed of light, and that speed of light is equal to the frequency multiplied by the length of the wave, the rapidity with which the wave goes out. I think I have given you enough of that, sir, so you will understand what I am going to say.

We use about 17,000 meters for our longest wave lengths, and can work efficiently on short wave lengths, with the present apparatus on the ships, within about from 50 to 100 meters from one to the other. At long wave lengths, using high power, it is practically true that we can not work within 500 meters, one station sending at the same time as the other.

Mr. WHITE. So that between 17,000 meters and 100 meters how many gradations—if that is the right word—are there where interference can be avoided?

Commander HOOPER. On an average, every 300 meters, practically speaking.

Mr. EDMONDS. Is that in the lower power stations, too?

Commander HOOPER. For lower-power stations it is very much greater. For short distances you can tune within 25 or even 15 meters.

Mr. EDMONDS. And when you get up to 10,000 or so you have to have a very much larger margin?

Commander HOOPER. Yes, sir.

Gentlemen, I would like to have this question of interference considered in three different phases; that is, as to three different sectors or areas of wave lengths; first, the short-wave lengths, the one the amateurs are interested in; second, the medium-wave lengths, which are the ones the ships use for working with the coastal stations; and, thirdly, the long-wave lengths, which are the ones by which the transoceanic work must be carried on. It would be wise to discuss each one of these three phases separately, and consider each one as a separate part of the bill, so that on each one you may form a judgment as to whether Government ownership would fit this particular phase. Then, after all three have been discussed, you will have your opinion on each one and be able to sum up and decide whether the three phases are proper for the Government to own and regulate as planned, or whether one out of the three is absolutely necessary to the Government to own or regulate, or two out of the three.

Whatever the decision is, it is imperative in the present state of the art that some congressional action be taken to clear up the situation, both from the point of view of the opponents of the bill and from the point of view of the Government. Otherwise we must assume responsibility for a very serious and dangerous situation which is developing and which will cause eventually the loss of great sums of money by commercial institutions.

Mr. HARDY. You mean by that that it is necessary this bill should be acted on either favorably or unfavorably?

Commander HOOPER. I mean it should be acted on favorably as to that part which affects safety at sea; if the rest of it is not acted on favorably it must be acted on definitely. Otherwise commercial concerns will spend great amounts of money in building stations which must eventually be taken away from them.

Mr. EDMONDS. Captain, you mean that unless we pass this bill for Government monopoly in this thing, it is going to be necessary for us to pass a bill with very much greater regulation than we have at the present time?

Commander HOOPER. Yes, sir; absolutely. That is the point I bring out. That is what brings up these bills each year, because some legislation is necessary, and we believe in taking the whole business, because we think we can do it better, more efficiently, and cheaper.

The opponents of the bill believe it is unnecessary for us to take it all, but I think they are willing to grant us a good deal. Whatever we do, we must do something. It is absolutely essential. It is a serious situation, which tends to the point of bringing about international troubles. I will get to that a little later.

With your permission to proceed with each phase separately, I will first discuss briefly the amateurs, which question was pretty well cleared up yesterday by Lieut. Cooper in connection with the amendment to this bill. I was myself an amateur at one time, although we did not have the radio amateurs then; we had little telegraph lines between our houses, we boys, and I have the point

of view of the amateur. I agree it is very interesting to the amateur, and very educational, and it is a great advantage to the radio art to permit the amateurs to develop themselves, and it is of great value to the Government, as I stated before, to have all these operators self-trained for use in case war comes upon us.

The amateurs, of course, can not afford to expend large sums of money on radio stations and build large aerials for long wave lengths, and naturally they prefer to have the short wave lengths and the small aerials, which fit admirably into our organization and are in accordance with the present law. So I think there will be no objection on the part of the amateurs as a whole to the amendment as it stands.

To go back to our illustration, if we assume that the piano has 170 keys, the amateurs would have the first two keys; they would have the first 200 or 250 wave lengths. That would give them the opportunity to use the space that our receivers are not particularly tuned to, and the short wave lengths are entirely sufficient for their purpose.

I do not think there will be any objection on their part to our judgment in that matter. The judgment has been arrived at as a result of conferences with the amateurs, and it fits in pretty well with the general scheme of things.

The next phase of the situation is the one where the ship-to-shore business is concerned and the work between the ships on the high seas. The Navy has a number of coastal stations scattered along the coast which can operate from 400 to 800 miles—halfway across the ocean, some of them. The Marconi Co. had a number of these stations scattered intermittently between the naval stations on the Atlantic coast and some on the Pacific coast. The Federal Telegraph Co. had some on the Pacific coast.

The idea originally was for the Marconi and Federal stations principally to operate with the ships and handle their messages, their ordinary telegraph traffic, for personal convenience. The idea of the naval stations was for military service to the ships, which is highly necessary. It was found, after the stations became sufficiently numerous, that when one station was working another station would be interfered with, not because there were not a large number of wave lengths in this area of wave lengths, but in order to guarantee that all ships can intercommunicate and communicate with any shore stations they happen to pass in any part of the globe they must all communicate on one wave length, which happens to be designated as 600 meters. That wave length is agreed to internationally and is in common use throughout the world.

If that had not been agreed upon, it is obvious that ships choosing any wave length they wished to call the shore station, and the shore station listening on all wave lengths at the same time, they would not hear the calls. A ship in distress might require hours before she could reach anybody, and it would be a very serious situation. In fact, it is absolutely necessary that all ships and all coastal stations which are able to work with the ships should call and answer each other on 600 meters.

Now, since that is necessary, it must be a matter of very careful regulation to see that they do not interfere with one another. For example, a ship on the high seas, 300 or 400 miles off the coast,

wishes to send a message to Norfolk at the same time that Norfolk wishes to send a message to the ship. He calls Norfolk, and Norfolk tries to send a message to him on 600 meters, and Charleston begins to send a message to some other ship on 600 meters, and this poor fellow is out there where the signals come in equally strong from both stations, and he can not read either. With hundreds or thousands of ships along the coast and many coastal stations all trying to work, on the same wave length, it can be readily seen that there is endless confusion, unless the most careful regulation is exercised.

Mr. BANKHEAD. What sort of regulation do you suggest, in that connection?

Commander HOOPER. That is regulated by law; sir. Each station has its own zone, geographically, and is supposed to work only with ships that pass within that zone. The objection to the old arrangement was that our stations would work with ships at the same time that the commercial stations would work with ships, and both would work more or less in the same zone.

For instance, take our naval station at Norfolk, as compared with the Marconi coastal station at Hatteras, which is 200 miles down the coast. Suppose there was a merchant ship off in the vicinity of Hampton Roads. He would have to send his message clear to Hatteras, because the naval station, right close by, could not handle commercial business. For that reason he would have to send on high power to reach Hatteras, and that would drown out all the signals the naval station was trying to receive from the men-of-war. So there is a sort of criss cross there that is avoided and regulated if one system is used—that is, if there is a station placed every 100 miles or every 200 miles, as may be necessary, when a ship comes into the zone of a station she operates with that station; she does not have to operate with some other station, because the particular station nearby happens to belong to the wrong company.

Mr. EDMONDS. But you can not confine the waves to that zone; so, if a ship were in another zone, the two waves would still conflict.

Commander HOOPER. They would conflict to some extent, sir; but not anywhere nearly as much.

Mr. GREENE. Captain, in case a man had an important business message that he wanted to send, and the Navy wanted to do a little talking with some officer for some purpose, who would get the privilege? Under what control?

Commander HOOPER. There is no question about that now, sir.

Mr. GREENE. Oh, I ask the question about that now. You are bringing this up as a matter of importance that the Navy should control the business. Now, suppose an important business proposition comes up and a man wants to send a message, and a couple of naval officers are having a nice conversation. Which would have the preference?

Commander HOOPER. The stations are adequate, sir, to handle both without any delay whatsoever.

Mr. GREENE. There would be no objection?

Commander HOOPER. There would be no objection to that extent, sir.

Mr. GREENE. Oh, I know; but let us understand—

Mr. EDMONDS (interposing). Ask him how they handled it before.

Mr. GREENE. Yes; before you took possession. If an S. O. S. came in did not everybody just drop everything and say, "We want to save lives"?

Commander HOOPER. No, sir; they did not. They tried to, but they would make so much noise they could not. I have heard a poor ship making the S. O. S. call and everybody interfered with it.

Mr. GREENE. How are you going to help that now?

Commander HOOPER. There will be a particular naval officer in each district who will have the authority and be recognized by all the stations.

Mr. LEHLBACH. Can not we do that without the Government owning the stations?

Commander HOOPER. No, sir; we can not.

Mr. GREENE. I want to understand. Are business affairs going to have as fair a chance under Government ownership as they would under private management? I want to know where the line is going to be drawn and who is going to determine it. If a couple of naval officers are discussing something between themselves from one boat to another nobody knows what they are talking about any more than you do on a telephone to-day. Now, if a man has an important business proposition, how is he going to get a chance at the radio if the naval offices are passing the compliments of the day?

Commander HOOPER. They do not pass them, sir. You ought to see our regulations.

Mr. GREENE. That is what I want to know.

Commander HOOPER. Our regulations are very strong on that. The radio in the Navy is not permitted to be used excepting for official business, absolutely, and the commander in chief is more particular about that than anything else.

Mr. GREENE. Then for official business. Which would have the preference?

Commander HOOPER. There are ample facilities, so there will be no trouble about that.

Mr. GREENE. Then what is the occasion for interference?

Commander HOOPER. The trouble about interference is that when there are two systems going then we are both trying to handle more or less the same work, with two stations regulated by different people, and there is nobody to settle the differences that arise.

Mr. EDMONDS. Was there not a division of time between you and the commercial people before you took the plants over?

Commander HOOPER. There has always been in the law, but it has never been carried out.

Mr. EDMONDS. Whose fault was that?

Commander HOOPER. The fault of both sides; they both wanted to work at the same time. That is not workable from either a commercial point of view or naval point of view.

I want to say, gentlemen, that I do not believe there is any argument from any of the commercial people present. I know for a fact that there was not any particular money in this business of owning the coastal stations for the companies that owned them. They were willing to sell them. They made money out of the ownership of the ship stations, because they could charge high rentals—

Mr. GREENE. But they are valueless without the shore stations.

Commander HOOPER. I think they will agree the shore stations were merely put there for the convenience of their ship stations. They made them valuable. But if we do the same thing the ship stations will be worth just as much to them, if we handle the commercial business, as they would handle it.

Mr. LEHLBACH. Before you leave that, may I ask a question? I read somewhere within the last few days that more than one message can be received simultaneously by a receiving apparatus. Is that so?

Commander HOOPER. Yes, sir.

Mr. LEHLBACH. How about the interference in that case?

Commander HOOPER. If it were not for the fact that all the ships have to listen for calls on the same wave length and that the apparatus should not be tuned too sharply—otherwise the man listening will not hear the ship call, even if he has nearly the same wave length—then there would be no question in it as to this second phase. But the ships must listen on this 600 meters, and the shore station must listen on that, otherwise their calls will be unheeded. I think it is obvious that to get the best service we must have it under the most highly organized control. I do not think there will be any objection to this on the part of the commercial companies. Their objection is going to be on the third phase.

Mr. GREENE. You have wiped out pretty nearly all the commercial companies, haven't you?

Commander HOOPER. They have voluntarily given up, because they could not see that there was any money in it. They are after this other business; that is where the competition comes in.

Mr. WHITE. I understood you to say you used a 600-meter wave length. The question that arises in my mind is, If you reserve an area or a wave length of 600 meters and a margin of safety up and down on each side of it, if you reserve that exclusively for the use of these ship-to-shore stations and compel all others to keep away from those limits, why would not that take care of that situation as between ship and shore? I just ask for information, you understand.

Commander HOOPER. The ships must always call on 600 meters and they must always answer on 600, and the same way with shore stations, otherwise the receivers will not respond to the calls. But it is our proposition that after we have received that call and answered it we can make use of the area above, as you suggest, by letting them do their work in that area after they have established communication, which is not regulated under the present law.

Mr. WHITE. But, if 600 meters is the standard as between ship and shore, how would it affect the situation if private concerns were allowed to operate, for instance, on a 1,000-meter wave length or 200-meter wave length? It would not interfere in any degree, would it?

Commander HOOPER. The 200-meter wave length is down in the amateur's domain. It is necessary, in order to accommodate the large number of communications that are carried on simultaneously, that after we have established communication on 600 meters we make a little signal, a single letter, which means to shift to 1,000, or shift to 1,800 and carry on the rest of the communication. In that way we avail ourselves of this whole area.

Mr. WHITE. So that, as a matter of fact, although 600 meters is the standard which you have adopted, you do not use it exclusively?

Commander HOOPER. Not exclusively; no, sir. It has got to be used exclusively for commercial work, but in the Navy we shift off of it to get out of the way of the commercial work, after we have established communication, and we intend to advocate letting the commercial stations shift also.

Mr. WHITE. In that connection, suppose you confined your naval work and your work governing the movement of merchant vessels to this 600 meter wave length and kept all others away from that, would not that answer the purpose?

Commander HOOPER. They must all be on one wave length to start with; otherwise they are not going to be heard. In other words, they have all got to use the same key to get in the safe. After we get in we can use different drawers if we want to.

Mr. BURROUGHS. Why is it necessary to use any different drawer?

Commander HOOPER. Because if we do we can carry on more pairs of communication at the same time.

Mr. WHITE. If you confined it to your naval work and your control of vessels, and kept away the commercial business, could you not do it on your 600-meter wave length? Is not that the difficulty, that you are doing commercial work and superimpose on that your naval work?

Commander HOOPER. No, sir; the whole work has to be accommodated in this area. It is more the location of the station that brings the trouble there. For example, a ship will be right near Norfolk, but she is not allowed to work with Norfolk, which could be done on a very low power and without interference; so she has to work with this commercial station away down at Hatteras, which is a very much greater distance and has to use high power, which drowns out all the other signals, both for Hatteras and Norfolk and everybody else. That is the answer to that.

Mr. ROWE. You say that commercial business is done on 600 meters. Why is it not practicable to have a road there, for instance, from 400 to 800 meters, having your calls all on 600 and your messages on another scale?

Commander HOOPER. That is more or less what we do now, because we have had to do it. That is a very good point, and I see you have gotten the idea. Our point is that we have these stations along the coast, and if we do not put them under one management the ships work with the station which is not the logical station or the nearest station, and therefore there is a good deal more interference than is necessary.

As I say, the commercial companies are not contesting this particularly. There is only one company that I know of that does. For example, the companies that had commercial stations—Marconi, they have decided that the money is in the high-power transoceanic work, and the Government is the logical one to handle this coastal work; and the Federal Co. have decided the same thing; the United Fruit Co. have previously favored the bill—Mr. Davis of that company has previously favored the bill. The only other company is the International Radio, which owns two small stations, and their argument is based on the patent situation. That is a matter I will take up later.

Mr. EDMONDS. Your statement is not perfectly clear to me. You say this ship will work with a commercial station. How can it? Take the Jersey coast, for example. Say there is a wireless station at Sandy Hook, and a ship station at Cape May. A ship passing along the coast near Sandy Hook sends out a message, but Cape May gets it just the same.

Commander HOOPER. No; but they have to talk back and forth. She has to call and Sandy Hook has to answer. Sandy Hook may have a message for her, and she may have a message for Sandy Hook.

Mr. EDMONDS. I know, but you say if you have this in your hands a ship will be able to talk to its own particular station in that zone.

Commander HOOPER. My point is this: Suppose that Sandy Hook were owned by the Government and Cape May by the Marconi Co. Suppose this ship were up off Sandy Hook. Under the present law she would have to send her message clear down to Cape May, several hundred miles extra, and use a tremendous amount of power to do it, and cause interference with all the other ships around.

Mr. EDMONDS. Is it really a greater expense to send to Cape May, several hundred miles more?

Commander HOOPER. It is not the expense, it is the interference. That means that while she is right off Sandy Hook there may be a lot of other ships trying to call Sandy Hook and they can not do a thing, although that ship is not sending to Sandy Hook, she is sending to Cape May.

Mr. LEHLBACH. If she were sending to Sandy Hook instead of Cape May nobody else could do anything there either?

Commander HOOPER. She is not allowed to send to Sandy Hook now, she has to send to Cape May, and interfere with both of them. Why should it be necessary to interfere with both of them?

Mr. EDMONDS. Suppose she is directly off Cape May and wants to send a message to Cape May. She is a Marconi boat, with Marconi apparatus. At the same time you have other boats near Sandy Hook trying to call Sandy Hook. If she sent it to Cape May, would it not interfere with the boats trying to get Sandy Hook?

Commander HOOPER. She can do it fine, as long as she is near Cape May.

Mr. EDMONDS. Why would it not interfere with the boats trying to get Sandy Hook?

Commander HOOPER. Because she is using low power. She talks in a low voice. But if she were trying to talk from Cape May up to Sandy Hook she would have to yell her lungs out, and everybody on the ocean would have to stop work.

Now I think I have convinced you gentleman that from the point of view of interference it would be waste for two concerns to operate in this wave length area. And there is no particular objection on the part of the commercial companies, because we are not throttling any industry at all, as this industry is not a profitable one. That is where the law is most needed, in connection with these coastal stations; that is where the ships at sea are concerned; that is where the lives are involved.

Mr. LEHLBACH. Would it be practicable to have the call standardized at, say, 600 meters for naval and Government work and 1,000 meters for all commercial work, and in that way cut out interference in calling and signaling and getting into communication?

Commander HOOPER. It is more or less regulated that way now, sir.

Mr. LEHLBACH. Then, they are not all on 600 meters now?

Commander HOOPER. No. The possibility of interference in any particular wave length is due to many wave lengths on either side, and it is especially so as the sending station is near the receiving station.

Mr. GREENE. Is not this interference caused by the complexity of the naval business and the complexity of the commercial business? Now, is the commercial business good for nothing? You say these parties can not make any money. Are we to understand that commercial wireless is a failure?

Commander HOOPER. No, sir; the money in it is on the ship end of the business and not on the shore-station end.

Mr. GREENE. Then, what do you want it for?

Commander HOOPER. We want it to reduce the interference.

Mr. GREENE. Is that the only thing?

Commander HOOPER. And the general good of the country, the same as we own the Life-Saving Service and the Coast Guard Service.

Mr. GREENE. Is it not also that you want the money there is in it?

Commander HOOPER. No, sir. We used to say we wanted the money, because we thought it appealed to you, but now we see you are against that, and so we say we do not want the money. [Laughter.] It used to be the general policy of Congress, sir, to try to save all the money they could through governmental agencies. Now they are getting distrustful of Government ownership, and they may have a right to be, so we are not appealing to them on that ground; we are appealing strictly on the ground of interference and improvement of the service.

Mr. GREENE. Now, wait a minute. This Government ownership business, so far as it has been developed until the last six years, for instance, has been very extravagant; nobody can make any excuse for it. Now, I understood the Secretary to say yesterday that what you wanted this commercial business for was because there was money in it; you wanted Government operation because the Government wants to get the money. You want to administer private enterprise; the Government itself wants to do the business.

Commander HOOPER. He was speaking about the high-power stations. I am talking about the coastal stations.

Mr. GREENE. Well, you come here to explain this business, and you get into deeper mysteries instead of getting down to the point.

Commander HOOPER. I will get to that point when we discuss the high-power stations.

The CHAIRMAN. You stick to your text and do not let the gentleman from Massachusetts divert you.

Mr. GREENE. I do not want to divert him from anything, but I want him to keep to the line of what we are trying to get at.

Commander HOOPER. I would like to say, sir, that I believe if you would take a vote right now of the opponents of this bill and the majority of reasonable thinking men in radio work who are here on both sides, bearing in mind their interest in the matter, you would have a large majority, almost a unanimous vote, in favor of this proposition.

Mr. GREENE. Well, you might be as disappointed as the Democratic Party was in the last election. [Laughter.]

Commander HOOPER. Well, sir, I have talked to all of them, and I know their views.

Mr. EDMONDS. Do you mean the ship-to-shore business or the entire thing?

Commander HOOPER. The ship-to-shore business and the amateurs.

Mr. EDMONDS. Now, let me ask you a question about the ship-to-shore business. Is it your intention, when you get control of the ship-to-shore business, to continue on the 600-meter wave length entirely, or is it your intention to get these stations on a different wave length?

Commander HOOPER. It is our intention to bring up that question at the next international radio conference to try to get the maximum use of the ether.

Mr. EDMONDS. Your own idea would be what?

Commander HOOPER. My own idea is that we ought to continue that 600-meter wave length for some time if that is decided upon as the best calling wave and use that purely for calling, acknowledging, and S. O. S. signals and for navigational purposes, possibly, and when communication has been established that we make one letter to indicate the wave length in the area that can be used for ship-to-shore work, which they will shift to in order to carry on the communication.

Mr. EDMONDS. That is one of the improvements you have in mind by having one ownership of these shore stations?

Commander HOOPER. Yes, sir; we can do that with one ownership if we can get all the stations to carry out our orders.

Mr. EDMONDS. Well, if you own all the stations, you ought to be able to get them to carry out your orders.

Commander HOOPER. Yes, sir; we can do that.

Mr. WHITE. You said your idea would be to give a letter which would indicate that you desired to shift to some other wave length and talk?

Commander HOOPER. Yes, sir.

Mr. WHITE. What are the practicable limits of wave lengths within which these instruments can operate?

Commander HOOPER. In the ship-to-shore business, for example, the area is restricted between, say, 300 meters at the lowest extremity, and 3,000 meters at the highest, because the aerial of a ship can not be made very long; it is limited between the masts.

I wanted to bring out this point, gentlemen. I have talked to nearly all the opponents of the bill, and especially those who would be in any way injured by the loss of profits, and I think they are all convinced that the art and the service of the United States will be greatly improved, and they are all willing to let the Government run it, and are satisfied we are the logical owners, either the Government or some one company. And, as I stated before, either the Government or some one company must monopolize this particular area of wave lengths to give the ships sufficient service. And if one company is designated, what company would you trust? If you put it in the hands of a private company they might do very well now, because they know the reasons why the law was passed, but a few years from

now they may have directors who would be tempted to put the prices up. The Government would not do anything like that.

Mr. EDMONDS. Would you trust this committee? [Laughter.] We might get up a company of our own to run it.

Commander HOOPER. I would trust it if you would actually do it.

Mr. HARDY. If I understand the whole situation it is that at Norfolk, for instance, it is not a good idea to have more than one sending and receiving station of high power?

Commander HOOPER. Medium power, sir.

Mr. HARDY. Of medium power, yes. If you had two or three right there they would be constantly interfering with each other?

Commander HOOPER. Yes, sir.

Mr. HARDY. If one of them was owned privately and one by the Government they would be constantly getting in each other's way?

Commander HOOPER. Yes, sir.

Mr. HARDY. So it seems to you necessary to have just one station at Norfolk?

Commander HOOPER. Yes, sir; that is the thing.

Mr. HARDY. And that one station must be owned by somebody?

Commander HOOPER. It must be owned by somebody; yes, sir.

Mr. HARDY. If it is owned by the Government it is a Government monopoly, and if it is owned by the individual for mercantile purposes it is a mercantile monopoly?

Commander HOOPER. Absolutely a mercantile monopoly; yes, sir.

Mr. HARDY. So the choice is between having a private monopoly and a Government monopoly, one or the other owning that station at Norfolk? That is the whole thing?

Commander HOOPER. That is the whole thing in a nutshell, and there is not any particular opposition to it.

Mr. LAZARO. From your experience in the service, for the good of the people, which do you prefer, Government monopoly or a private monopoly?

Mr. GREENE. Well, he is a prejudiced witness.

Commander HOOPER. I will try not to be prejudiced, sir. I would say the Government would give better service, because they are unbiased.

Mr. LAZARO. In time of war and in time of peace?

Commander HOOPER. In time of war and in time of peace. The Government is not interested particularly in any financial transactions. The officers of the Government at sea and elsewhere are only trying to make good.

Mr. LAZARO. One more question: If the Government comes in and takes charge of this whole business, are you not afraid that it will perhaps interfere with individual initiative and improvement of the art, and so on, and in the long run cripple the service?

Commander HOOPER. No, sir; I am going to dwell at length on that after I get through with the general interference question.

I want to emphasize particularly in this connection that companies which have been in that business are generally agreed that we are the proper ones to do it, and there is not any particular objection on their part to that, because it is not the main money-making business. I also want to state that our testimony, gentlemen, is the testimony of men who are interested in the good of the whole and

not interested in any financial transaction. We have nothing to make out of this either way, and the commercial people must naturally testify, as it is going to affect their pocketbooks—and I do not blame them. That is the reason I believe the Government should not go into any ownership where a natural monopoly is not absolutely necessary for efficiency.

Mr. LAZARO. It seems to me that if we remove the financial spur we do interfere with initiative and invention.

Commander HOOPER. Yes, sir; but the financial spur does not amount to anything in this particular area.

The maximum efficiency of the radio is the sole object of our favoring this bill. We have not anything to gain by it personally, and we are interested in it for the good of the whole. The people on the other side must be looking out for their own interests, and that is perfectly logical. It is not to our Government's interest in any way to prevent the people from making money. We want to have them make money. That is the principle of democracy. That is the reason we oppose Government ownership in other things, because we want to protect people in making money.

Mr. GREENE. What do you mean by "other things"?

Commander HOOPER. Everybody getting in and making all he can. This bill has not anything to do with that, as far as the coastal stations are concerned.

Mr. EDMONDS. Democracy is perfectly safe, then, if we do pass that phase of it?

Commander HOOPER. Yes, sir; democracy is perfectly safe.

We have these coastal stations now. All we want to do is to open them to business. We have had them all the time. We will probably make a profit off of them and probably make them pay for themselves. We would probably have to have them anyway for military purposes, and why not let the Government save money by letting us take the place of the companies?

The CHAIRMAN. Some gentlemen do not seem to understand that the Navy Department has coastal stations all around the coast, on the Atlantic, the Gulf, and the Pacific, and extending to our outlying possessions at the present time.

Mr. GREENE. Yes; in time of war.

The CHAIRMAN. And they must be maintained for military purposes; they must be maintained in order to navigate our naval vessels. At the same time there are commercial stations along the coast at substantially the same points where the naval stations are located, being used for the ship-to-shore business. If I understand your viewpoint, as it is absolutely necessary for the Government to maintain these stations for military purposes they might as well be utilized for commercial purposes from ship to shore, and thus serve the double purpose, and at the same time prevent interferences and increase the efficiency of the service—

Commander HOOPER. And pay for themselves.

The CHAIRMAN. And the money that may be earned commercially will diminish pro tanto the expense of maintenance of these military stations.

Commander HOOPER. That is absolutely the general summation of the subject. Also, there is not enough money in it anyway for any-

body to be desirous of being in it from a financial point of view. Most of the people admit it. Some of them will not say they admit it, because they have patent rights, and so on, which they are trying to get money out of. But that is a separate matter, and should be considered as a separate matter.

There is another part in that coastal station matter——

The CHAIRMAN (interposing). Right in this same connection: We have built up a large merchant marine, and we are increasing our tonnage, hence the ship-to-shore station, from a national viewpoint, is becoming more important all the while, and the same places that are now under control of the Navy and utilized to communicate with our naval vessels could be utilized to communicate with our merchant ships at sea, and with the increase of our merchant marine that phase of it assumes the larger importance?

Commander HOOPER. Yes, sir.

The CHAIRMAN. And, whether under governmental control or not, it should be under one unified control?

Commander HOOPER. Absolutely under one control.

There is another point that I may mention which is really interesting and also has a bearing on this subject: The Government is putting a system of additions to its stations, by which it can give the bearings of ships at sea, showing their direction from the station. For instance, a ship going along the coast and passing a lighthouse may get its bearings and find out where it is by communication with the lighthouse. For instance, the light is not visible in rainy weather and foggy weather at distances from shore, and at the very time you need the light you can not see it. We have developed with the assistance of the inventive genius of this country and other countries a radio compass, as we call it. It is a little receiver which measures the direction that the radio signals are coming from. You would not think it possible, but as soon as we get that signal we can send out to the ship with our transmitting station a message and tell them where they are. You can see what an immense value this is going to be to navigation, how many ships will be kept off the rocks in foggy weather; that is the time they run aground; they do not run aground so much in clear, nice weather.

Mr. EDMONDS. You mean the Navy Department developed this?

Commander HOOPER. From our own experience, and we have taken advantage of the inventive genius of the country, and we are putting these stations in.

Mr. HARDY. That is a discovery within the last year or two?

Commander HOOPER. It is a discovery since the war broke out.

Mr. EDMONDS. An invention of the Navy Department?

Commander HOOPER. It is a combination invention. We are first to see the need of these things, and we advertise it and the inventors cooperate with us.

Mr. EDMONDS. If you have no other stations you naturally would be the only people who would think of it?

Commander HOOPER. I will keep on with coast stations. They do not develop very fast under commercial control, because it costs so much to renew apparatus. Our commercial stations have done always a good deal better and have been a good deal more efficient than commercial stations, because we can afford to be a little more liberal

in spending money and putting in new apparatus. We have got to do it in order to keep the fleets supplied with equipment they insist on to compete with the world.

Government ownership is objectionable on the part of some people who say we are in competition with anybody and no one will want to develop—I am a little ahead of my story, but I will just mention this now. We are in competition, that is, our Navy is in competition with the navies of the world. We fellows are right on the job, and our function is to get ahead of foreign nations, and for that reason we are right in the forefront of invention in all things that have to do with the Navy and radio has a great deal to do with the Navy, so we are right on the job there. And when you hear my little story of what we have done in the war, you will see we have been on the job and you will be proud of us. I will not tell you what we have not done, because you might not retain us.

I think the chairman has summed up the general coastal station, and I will pass on to the high-power stations. They are the stations of long wave length areas, and the stations which communicate are across the ocean. They are the stations which compete with the cables for the handling of messages over sea, and I am not making any new prophecy when I state that the competition will be very keen. It costs a great deal less to build radio stations than it does to build cables, and the maintenance is very much smaller for the radio. If genius can perfect the stations so that they will work satisfactorily across the ocean, the cables have got a hard road to hold their own.

The war has developed these stations very much more rapidly than they developed before. Prior to the war, as explained yesterday by Lieut. Cooper, there were only a very few stations that pretended to communicate across the ocean, and they did it only a certain part of the day, the other part of the day being interfered with by certain atmospheric disturbances. Since the war has been on we have established reliable communication across the ocean, and now we never miss a message from the other side. That is a fact.

Commercial concerns are keenly interested in this bill, because they fear the taking away of the high-power stations from them, and that is a point where money is involved and where the advance of the art in the future will be the greatest, they say. That is their point, and they claim that the Government should not own these stations on that account.

However, the fact is that the number of these transoceanic communications you can carry on simultaneously is considerably limited. In fact, at the present time, with the present status of the art, we are unable to use many more stations as high-power and as transoceanic stations than we have, taking into consideration the fact that the interference is not only from our own stations but from the stations in the various foreign countries and on both sides of the ocean.

For instance, here in Washington our signals are interfered with when we are trying to receive from Lyon, France, by Rome and Italy, or by our own station in Annapolis, or by the station in Honolulu, and we must consider this interference problem as a whole when we discuss this matter, and not only just because of our own United States interference. I think there will be many opinions expressed on both sides of this question which will be convincing,

and it is my purpose to bring out the advantage to the Government of the Government owning these commercial stations. There are certain logical doubts as to whether the step is proper, logical doubts which will originate in your minds, and I am not so absolutely insistent myself on that phase of it as I am in regard to the coastal stations, because I consider that absolutely some action must be taken in respect of the coastal stations. I consider if you do not take action on the high-power stations that we are storing up trouble for ourselves, and when you will have to take action finally it will cost us a lot more money and a good deal more heartburn.

The fact is that as the art develops further we will be able to have more high-power stations, more transoceanic circuits, but, at the same time, we must realize that every country is going to put up its own stations, either commercially owned or government owned, and that those things progress very rapidly, and it will soon be a question where an international board will have to try to get at the bottom of the matter and regulate these high-power stations, or else we will have international difficulties. Some foreign country will take up through diplomatic channels the fact that we are not respectful to them because we are interfering with their messages, and we will come back and say they are interfering with our messages. We are liable to get in some sort of a row.

Mr. EDMONDS. Why can not they be regulated just as well under private ownership as they can by Government ownership?

Commander HOOPER. Well, that is a question that I think Capt. Todd brought out yesterday. I would rather let him answer that.

Mr. EDMONDS. Of course I understand that if the laws or regulations that have been made have not been carried out on a vital question like this they should be carried out. If we make laws and you folks fail to carry them out it is not our funeral. If we make regulations for the handling of this matter through this parliamentary procedure here and we follow that up with laws regulating private business, if you do not carry them out in some way by some department, then, of course, we can not help it and it is your fault.

Commander HOOPER. Suppose we allow these high-power stations to be built, and after they are built supposing they did start to build them after the war, as they probably will—all the different nations and commercial companies—and then suddenly they all begin to work, what are we going to do? We will have to have an international commission established, and they will decide that only one station can be used in the country, or something like that, and all of these fellows will be out millions of dollars, which they may put into the stations.

Mr. EDMONDS. That is a commercial risk they take. That is no business of Congress to regulate a man's commercial desires. That is his own business. If he wants to spend his money on a guess, as many hundreds of people have done during this war by promises made by the Government that have not been fulfilled, it is perfectly up to him to do so.

Commander HOOPER. That is a risk that we know more about than he does. I think it is more or less a patriotic duty to our citizens to put that in.

The CHAIRMAN. The commercial end of it seems to occupy the minds of more people than any other. If a half dozen companies

want to develop high-power stations for international service and sell their stock on the market at a profit, and the enterprise becomes a failure because of interference or for any other reason, it is no concern of the Government. But a feature of it to which you called attention is this: Shall we have a half dozen companies in this country capitalized for large sums, the money for which has been contributed by a confiding public in the purchase of stock, of which 50 per cent usually goes to the promoters, but the balance has been expended in the developing of the station. They all undertake to do business, and they want to make profits, properly so. In the other countries they duplicate that same unwise course from a commercial standpoint and international complications ensue. Somebody must interfere. It is proper for the Government to interfere and regulate them. They can not all exist and profit and thrive commercially. It will ultimately lead to monopoly in one or the other and governmental control. Otherwise these complications will continue indefinitely. Is not that true?

Commander HOOPER. Yes, sir.

Mr. EDMONDS. By licensing and regulation we could accomplish the same purpose as Government ownership?

The CHAIRMAN. Government control by these nations—in other words, they must act in harmony and adopt some method whereby each Government owned these high-power stations or controlled them. There ought to be uniformity, so that the stations of one country will not be regulated prejudicially in favor of those of another; in other words, there should be equal rights, equal privileges, equally beneficial, to the end that the highest class of service may be rendered; and, of course, looking at it from the commercial end, that is the most reasonable thought.

Commander HOOPER. I hope to see the greatest development in this high-power business, and I certainly think it will be a wonderful step in advance if this comes about. Of course, we can not foretell what will come about, but I predict there will be a great development in a few years to come. It is just a short time since you witnessed the first trans-Atlantic communication and now we see it actually a fact on a very cheap basis. But there can not be any objection that I can see to the Government using its stations for commercial business. It has got these stations. We had them put up in time of war for use in case the cables were cut away, which some of them were, and at the earnest request of Gen. Pershing, and I think it would be good business to open up those stations to commercial business.

As I say, Capt. Todd's arguments were mainly on that line and mine are purely technical, so it would not be wise for me to repeat his testimony about the advantages of these high-power stations being Government owned.

Mr. EDMONDS. Did you buy any high-power stations when you took over the Federal Co.?

Commander HOOPER. They are sort of between what you call medium and high power. The Federal Co. had a chain of stations on the west coast—one at San Francisco and one at Hawaii—and they did business in competition with the cables in that circuit; and we took over that circuit, among other things.

Mr. EDMONDS. Is that all the high-power stations they had, just between San Francisco and Hawaii?

Commander HOOPER. We call anything that works across the ocean high power, from one side of the ocean to the other.

Mr. EDMONDS. That was all they had, was it not, just those stations at San Francisco and Hawaii?

Commander HOOPER. Those did the transoceanic work.

Mr. EDMONDS. Did they not have a station in Mexico and did you take that over?

Commander HOOPER. No; we did not take that over.

Mr. EDMONDS. None outside of the country?

Commander HOOPER. None outside of the country; no, sir.

Mr. BANKHEAD. As I understand your position in relation to the high-power business, long distance business from one country to another is separable from the middle power stations?

Commander HOOPER. Yes, sir.

Mr. BANKHEAD. So that it would be possible on your theory for Congress to take charge of the middle-distance operations and either own or control it absolutely and leave entirely alone the long-distance communications.

Commander HOOPER. It would be entirely possible to do that, but it would not be to the interests, as we see it, for the Government to omit part of it.

Mr. BANKHEAD. It is a practical proposition?

Commander HOOPER. It is a practical proposition. If you would not do the whole business you certainly should be advised on our part, being the responsible party, to take over the coastal business at once.

Mr. BANKHEAD. And there is no real difference, then, in the operation of international communication and that for mid-sea distance communication, the middle-distance communication?

Commander HOOPER. Those trans-oceanic stations do not particularly interfere with coastal stations, if they are properly placed when they are built and have modern apparatus. Before we went into the war the Marconi people had a lot of old cheap apparatus in their stations. The station in California interfered with everything on the coast in the way of ship-to-shore business when they started up. Of course, it was the most modern thing at the time, and that was a step in the chain of events that led to the production of this fine apparatus we have now.

Mr. EDMONDS. We had quite a large argument about junk the last time. Do not let us bring it in this time.

Mr. HUMPHREYS. Commander, have we an instrument perfected by which you can direct the waves so that they will go in this direction and not that?

Commander HOOPER. We have, within limits; that is to say, you are speaking of high power now?

Mr. HUMPHREYS. I was speaking generally, because I have no information on the subject.

Commander HOOPER. We have an instrument that will send the waves stronger in one direction than in the other direction. That is, for instance, the wave instead of going out in all directions in exact circles and traveling on indefinitely, it goes out in egg-shape form; that is to say, it will be heard a thousand miles off in the direction

it will point toward, and it would only be heard 300 or 400 miles off on the side or maybe 500 or 600 miles.

Mr. HUMPHREYS. I was wondering if there were not such an instrument as would permit the commercial companies to operate on land and let them turn the machine around so that it would not interfere with ship-to-shore communications?

Commander HOOPER. We do that to some extent now.

Mr. HUMPHREYS. And if that could be done, then the Navy would have no special objection because it would not interfere at all with the Navy if these commercial companies could confine their activities to the land.

Commander HOOPER. You mean the high-power stations?

Mr. HUMPHREYS. I mean any they have got.

Commander HOOPER. Coastal stations working with ships?

Mr. HUMPHREYS. I say it would not interfere with ship-to-shore business if commercial companies were limited to the land for their activities and required to set their instruments so that it would not effect any interference with the ship-to-shore business. Then the Navy would have no further interest in it, would they?

Commander HOOPER. We have only interest in it so far as it would interfere with our own stations.

Mr. HUMPHREYS. And with your communication with the ships?

Commander HOOPER. I will say, sir, we believe that radio should be confined to use where it is a benefit to the community and you can not use other means of communication. Nobody wants to put up two radio stations when it costs a couple of thousand dollars to communicate if they can at four dollars a month obtain a telephone, for example.

Mr. HUMPHREYS. But, still, that would be his?

Commander HOOPER. Yes, sir.

Mr. HUMPHREYS. All of us do foolish things when it comes to the conduct of our personal enterprises. But the point I want to get at is this—and I have no information on it—I am seeking information: If we have an instrument that would confine these disturbances in the air to the land, so as not to interfere materially with communications from ship to shore and from shore to ship, then the Navy's interests in these land operations would cease, would it not?

Commander HOOPER. I would say, the "Governments' interest."

Mr. HUMPHREYS. No; but I am asking about the Navys' interests.

Commander HOOPER. When we speak of the Navy we speak of the merchant marine; is that your idea?

Mr. HUMPHREYS. Yes, sir.

Commander HOOPER. Well, there would be some interests the Navy would have.

Mr. HUMPHREYS. What?

Commander HOOPER. That could be regulated by license, I believe.

Mr. HUMPHREYS. What interests would the Navy have if it did not interfere with any communications going out to sea or coming from sea to you?

Commander HOOPER. It would be more of a precaution against spies and so on in war times.

Mr. HUMPHREYS. We are talking about peace. Of course, when war comes we will take the whole business over, if necessary, but we hope that peace will be our normal state.

Commander HOOPER. I do not see any field or possibility of us using anything inland except in special cases, like in the St. Lawrence River, where there are islands or on the Lakes.

Mr. HUMPHREYS. I understand that, Commander. Of course, the Paris Exposition authorities did not see any possible utility in the phonograph. They said it was rather an ingenious invention, but could not be put to commercial use. But we know there are limitations upon our vision. But if, as a matter of fact, you confine the commercial companies to the land, the Navy would not have any further interest in the matter, would they, if they could not interfere with the Navy out on the sea?

Commander HOOPER. It would interfere with anything we have now unless confined to very low power, because there is not any directing apparatus so good that if it uses enough power it will not interfere with everything along the coast.

Mr. EDMONDS. Has not wireless been used for dispatching trains?

Commander HOOPER. Yes, sir; it has.

Mr. EDMONDS. And very successfully during times of distress and storms, has it not?

Commander HOOPER. Yes, sir. It has been used, and we are right now arranging with the coast guards, I believe, if I am advised correctly, so that communication with their cutters on the Mississippi River for use in case of floods, and so on, and we have stations along the Lakes.

Mr. EDMONDS. We talked a good deal yesterday about the Wanamaker stations as a type of shore stations. As a matter of fact, it is but one of sending stations licensed in this country.

Commander HOOPER. You mean the amateurs?

Mr. EDMONDS. Amateurs and others.

Commander HOOPER. That is a fact. They do not interfere with us particularly.

Mr. EDMONDS. I was in Sunbury a short time ago, and there was a station in a dry goods store there that a man was using in communication with some other station on shore. I do not know what it was, but that is what they told me. There are thousands of them on shore.

Commander HOOPER. There are lots of receiving stations which jewelers use to get the signals each noon from Arlington.

Mr. GREENE. Since the war broke out they have not been able to do that?

Commander HOOPER. I have tried to explain this absolutely and impartially, gentlemen.

Mr. LAZARO. Mr. Humphreys asked you a while ago if you had an instrument that would concentrate waves in one direction, and in answer to his question you used the expression "egg-shaped."

Commander HOOPER. Yes, sir.

Mr. LAZARO. You said, for instance, the waves from it would go a thousand miles, for instance, directly, while on the side it would go 300 to 500 miles?

Commander HOOPER. Yes, sir.

Mr. LAZARO. What about the distance from the ends there?

Commander HOOPER. I am speaking very broadly.

Mr. LAZARO. I just wanted to get information on that.

Commander HOOPER. A signal that will reach France efficiently will be heard down in the West Indies almost as strong as it is in France if we use the most highly known directional type. That would be an example. Perhaps it would extend half as far on the side as it did in the front if we pointed the thing in the direction of the receiving station.

Mr. HUMPHREYS. Is that a new invention?

Commander HOOPER. No; that is not strictly new; some phases of it have been improved.

But I have tried to keep my testimony more or less on technical lines in this high-power business. With your permission I will read a review of our activities during the war.

Mr. HARDY. Did you want to discuss the patent phase before you read that review?

Commander HOOPER. I think it would be well to read that review first, if you gentlemen would like to have it. If not I will leave it out.

The CHAIRMAN. We should be glad to have it.

Commander HOOPER (reading):

RADIO DIVISION,
BUREAU OF STEAM ENGINEERING,
October 4, 1918.

Memorandum for the Secretary of the Navy.

A review of the activities and accomplishments of the radio division during the preceding fiscal year is hereby presented, summarized under four subdivisions.

1. Ship and shore coastal radio stations.
2. Radio for aircraft.
3. Transoceanic radio communication.
4. Research and development.

The organization as a whole being correlated and directed under the personal supervision of the officer in charge of the division.

RADIO FOR ALL SHIPS AND SHORE STATIONS, OTHER THAN TRANSOCEANIC RADIO STATIONS—NAVAL VESSELS.

In addition to the replacements, repair, and maintenance of the radio equipment on all vessels of the United States fleet and its auxiliaries for operation on a war footing, which have been effected by the radio division, the following new installations have been made or are being arranged for: 3 battleships; 80 submarines; 5 battle cruisers; 6 scout cruisers; 248 destroyers; 54 mine sweepers; 27 seagoing tugs; 40 light vessels for Department of Commerce; 17 lighthouse tenders for Department of Commerce; 440 110-foot submarine chasers, including 100 for the French Government; 112 Eagle patrol boats; 250 motor boats, yachts, etc., as auxiliary patrol boats.

Some of them have not been completed, but if the war had lasted a few months, if the ships had been completed, we had our part practically completed.

Making a total of 1,282 new installations for naval vessels provided for during the preceding fiscal year.

Considerable work has been accomplished toward standardization of installations with a view to providing for prompt repairs by the use of standard spare parts and also the production of apparatus in large quantities to meet the constantly increasing demands for radio equipment and the comparatively few manufacturers capable of producing suitable apparatus, owing to the necessity of employment of specially trained men who have considerable previous experience of a technical nature in the production of radio apparatus.

The remodeling of the radio installations on 22 units of the battleship fleet, to provide for efficient operation in conjunction with the British grand fleet, has been practically completed. A large number of the units of the fleet and its auxiliaries have been equipped with radio compasses and also radiotele-

phone transmitting and receiving sets (which apparatus is of the greatest practical value) after various difficulties in connection with the successful operation of this apparatus on shipboard had been overcome.

Practically all of the vessels of the fleet and its auxiliaries had been equipped with auxiliary radio transmitters for emergency use during the preceding fiscal year.

Replacements of radio apparatus of improved design on submarines, resulting in increased range of communication and greater reliability of the equipment, have also been effected.

In addition to the ex-German, ex-Austrian, Dutch, and various other vessels of foreign registry, acquired or chartered by the United States Shipping Board, for which their radio installations, replacements, and repairs have been effected during the preceding fiscal year, the radio division has contracted for and shipped to the various naval districts, as the apparatus has been delivered by the contractors, radio equipment for approximately 2,500 new vessels of the United States Shipping Board Emergency Fleet Corporation.

All privately owned vessels of the American merchant marine, under the control of the United States Shipping Board, numbering approximately 450, have had their radio installations maintained and repaired under the direction of the Radio Division.

The total number of existing and prospective radio installations for naval and merchant vessels, and those of other branches of the Government provided for and maintained by the Radio Division during the preceding fiscal year was in excess of 4,000.

The expense in connection with radio installations on Government vessels have been charged to the various branches of the Government operating the vessels, while that in connection with radio installations on privately owned vessels has been collected from the owner of the vessel; that is, the maintenance and expenses.

The naval radio coastal stations numbering 50 and the commercial coastal stations, taken over by the Government, numbering 75, have been maintained and operated during the preceding fiscal year and various additions, improvements, and enlargements considered essential to the successful prosecution of the war have been provided for.

The compensation to owners for the use of their stations taken over and operated or closed has been adjusted in a satisfactory manner to the owners and the Government.

Protective facilities, including quarters for the guards, etc., have been provided for all the important or exposed radio stations.

The following is an outline of some of the additional stations provided and enlargements, etc., including about 13 abroad; I am not sure whether it is 13 or 15 in France. We have a lot of shore stations there for our own forces.

Construction of 25 section patrol radio stations for communication between shore and patrol boats and auxiliaries; construction of 30 radio stations for air stations, including those abroad; construction of 25 radio compass stations for locating enemy vessels and unauthorized radio stations and assisting vessels to determine their position; construction of 3 radio transmitting and receiving stations at isolated points in the Republic of Panama, constructed for the Republic of Panama for operation by the Navy; removal of United States naval Newport radio station to Melville, R. I., as a precaution against possible explosion in the magazines at Newport; enlargement of the United States naval Norfolk radio station due to the establishment of the naval base, Hampton Roads; construction of radio station at Port au Prince, Haiti, for the use of the Marine Corps; enlargement and improvement of radio station, Santo Domingo City, Dominican Republic, for the use of the governor, Dominican Republic; enlargement and improvement of United States naval radio station, St. Thomas, for the use of the governor, Virgin Islands.

An immense amount of development and experimental work in connection with the production of suitable radio transmitting and receiving apparatus for use on aircraft has been successfully accomplished during the preceding fiscal year.

Prior to July 1, 1917, no service or training aircraft had been equipped with radio, due to the difficulties encountered in obtaining satisfactory equipment. Subsequent to July 1, 1917, however, the difficulties have been overcome to such an extent that 50 service aircraft and 40 training aircraft in the United States have been equipped with radio apparatus which has proved to be satisfactory, 60 outfits have been shipped abroad for installation on aircraft in France and

Great Britain, and contracts have been awarded for a total of approximately 3,000 complete outfits.

Arrangements have now been made for the equipment of all aircraft with radio prior to its being shipped abroad.

The radio telegraphic communication from aircraft in flight to stations on land can now be effected a distance of 200 miles. Similar communications from stations on land to aircraft in flight is practical up to a distance of 50 miles, while communication from aircraft resting on the water to points on shore is possible up to distances of 40 miles.

The development of the radiotelephone for use on aircraft has also been perfected to such an extent that it is now possible for the personnel of aircraft in flight to communicate to stations on land by this means a distance of 60 miles, while telephonic communication from stations on land to aircraft in flight is now possible up to a distance of 15 miles.

The regular reporting of positions of patrol planes and dirigibles to shore stations for distances up to 100 miles by means of radio communication has been accomplished at several of the home coast-patrol air stations, which demonstrates the fact that remarkably efficient aircraft radio equipment has been produced by the aircraft section of the Radio Division subsequent to July 1, 1917, notwithstanding the very great obstacles which had to be overcome.

A direct comparison of American with foreign apparatus showed that the American apparatus accomplished in one set what was being accomplished in Europe by two separate sets and an additional hand-driven generator. The range of American apparatus in the air is at least 40 per cent greater, and the range on the water is over 100 per cent greater. The weights of this apparatus, considering the head resistance of the apparatus, is the same.

During the previous fiscal year the radio division enlarged and improved several of the high-power radio stations, with a view to providing adequate and reliable, continuous transoceanic radio communication.

Four of the high-power radio stations on the Atlantic coast, namely, Sayville, Tuckerton, New Brunswick, and Marion, have been developed into reliable and efficient trans-Atlantic radio transmitting stations, capable of continuous radio communication with European stations.

In addition, the Annapolis trans-Atlantic radio transmitting station, which is the most powerful radio station in the United States, was constructed and commissioned during the previous fiscal year. This station was constructed to provide, in conjunction with the Sayville, Tuckerton, New Brunswick, and Marion transmitting stations, continuous communication with our forces abroad in the event all of the cables are cut. I will modify that slightly by saying that Marion was never quite satisfactory for continuous communication.

The CHAIRMAN. What station was that?

Commander HOOPER. Marion, Mass. It was one of the Marconi Co.'s high-power stations.

As an additional precaution and to provide facilities for the steadily increasing demands for trans-Atlantic radio-communication service, a station similar to that at Annapolis has been authorized for construction in the southern part of the United States, and plans for this station have been practically completed.

A new United States naval trans-Atlantic radio transmitting station located in France has been under construction by naval personnel, under the direction of the radio division, during the past fiscal year. This station is rapidly nearing completion, and when commissioned will be the most powerful radio station in the world, and will insure continuous communication from our forces in France independently of the cables, if this should eventually prove to be necessary.

Three trans-Atlantic radio receiving stations capable of receiving radiograms from the principal European stations have been established and developed, enabling the naval radio communication service to maintain continuous reception of radiograms from European stations.

A new high-power radio transmitting station is nearing completion at El Cayey, P. R., which, when commissioned, will be capable of trans-Atlantic communication with our possessions in the West Indies and our vessels cruising in southern waters.

Trans-Pacific radio communication facilities have been improved during the preceding fiscal year.

The United States naval trans-Pacific radio transmitting stations located at San Diego and San Francisco, Cal.; Pearl Harbor, Hawaii; and Cavite, P. I., and the subsidiary trans-Pacific stations at Guam and Tutulla have been enlarged and improved to meet the demands for increased trans-Pacific service. The Marconi Co.'s trans-Pacific circuit, Bolinas-Marshall, Cal., Kahuku-Koko Head, Hawaii, capable of continuous communication to Japan via Hawaii, has been maintained in condition for immediate operation should the military situation make it advisable to provide increased means of trans-Pacific communication.

The CHAIRMAN. I understand that this report refers to a period prior to the signing of the armistice?

Commander HOOPER. Yes, sir; this was written prior to that. Pretty nearly everything we have done was with the idea that the war would last some time.

In general, the accomplishments of the transoceanic section of the Radio Division during the preceding fiscal year have made it possible to supplant the cables for necessary communication for trans-Atlantic and trans-Pacific communication and also communication with our West Indian possessions should this need arise.

It is obvious from the foregoing outline of work accomplished by the Radio Division during the preceding fiscal year that an immense amount of research and development work has been necessary owing to the highly technical nature of all radio apparatus and the absolute necessity of conducting careful experiments before any alteration in the design of workable apparatus could be attempted, which alterations and redesign of radio equipment has been essential in order to meet the various demands of the service, notably radio apparatus for aircraft.

It is requested that attention be directed to the fact that there has been practically no increase in the number of technical employees of the Radio Division during the preceding fiscal year, notwithstanding the great amount of work of a technical nature involved as outlined in the foregoing.

Continued and patient experiments in connection with radio apparatus for aircraft have been conducted with a very limited personnel until it was possible to design and produce suitable and efficient apparatus for this service. From data available, it is established that the radio apparatus for aircraft produced by the Radio Division, and for which contracts for a large number of sets have been awarded are superior to similar apparatus used on aircraft of other belligerent countries.

Much has been accomplished during the preceding fiscal year toward the standardization of various types of radio apparatus and its component parts with a view to greater facility of exchange of spare parts and effecting repairs.

A large amount of research and development work has been necessary in connection with the establishment of efficient transoceanic radio transmitting and receiving stations.

The use of radio for fire control on naval vessels and aircraft has been developed into a practical service.

That is a very important thing, using the aircraft to control the ranges that we give to the guns when the guns are firing at the enemy. We developed that.

Three types of radio compasses have been designed to meet the varying needs of the service and they have proved their value both for the purpose of determining the positions of ships at sea and also for determining the location of enemy submarines and other vessels and unauthorized shore radio stations.

Our destroyers, having these radio compasses on board, are able to pick up the convoys very much easier. They used to go out and try to meet the convoys at a certain definite position that the admiral would specify, and destroyers would go out there and could not find them, especially if it was foggy or rainy; it would be like looking for a needle in a haystack; and sometimes the convoys as a result would have to go into port without any armed escort; but after we got

these radio compasses on board, we could get their signal and would know just what way to go; and it was a great improvement.

Mr. ROWE. Could not the enemy submarines pick up those messages also?

Commander HOOPER. Well, they were usually under the water. They could if they got on the surface and listened. But when we used it, we kept moving; we did not take any chances.

The Radio Division has assisted in the development of the radio telephone transmitting and receiving outfits during the past fiscal year and has equipped a large number of naval vessels with this apparatus which has proven to be of the greatest practical value.

A system of underground radio reception has been developed which obviates the use of masts to support an overhead antenna, which is of great value from an economical and military point of view.

Some of the opponents of the bill will undoubtedly bring up the same arguments that they have in the past, about the retardation of the advance of the art if the Government owns the radio stations.

The fact in the past has been that the Government has advanced the art most rapidly. And we have done it because we wanted the apparatus and were willing to pay for it, and we buy absolutely from the outside. We do not make it ourselves, although we have made some where they tried to charge too much, where they had a monopoly on a particular thing; we would make some particular apparatus and bring the prices down.

Mr. EDMONDS. Does your department own any patent rights now?

Commander HOOPER. I am going to discuss the patent situation as soon as I get through with the question of the advance of the art.

Mr. EDMONDS. I thought you were going to discuss it now; you had mentioned it.

Commander HOOPER. If you can judge the future on what the past has been, the art will be accelerated rather than held back by Government ownership. We have been noted among the radio world for taking the lead in this country, and they seem to center on us as the place to bring all their inventions, and bring all their apparatus to see whether it is a good thing or not. We encourage every inventor. We keep competition open for the purchase of our apparatus, and we have been the leading "pusher," you might say, in trying to get out of the art all there was in it.

Among the examples that I could give of things that we have taken the leading part in developing—that is to say, we did not develop them ourselves but we got the inventive genius of the country, which is very capable, busy and they produced results.

For example, in the aircraft radio there has been a wonderful development during and prior to the war. When I was in the bureau before they had only been making aeroplane flights for a year or so and there was very little development in aircraft radio. In fact, a few sets had been made with such short range that it was not believed possible to develop the range so as to be worth anything to the aeroplanes. The maximum range then was thought to be 20, 30, or 40 miles, and the aeroplane could fly and report its own scouting results, 20 or 30 miles, quicker than they could send a message that distance.

So that there was not much encouragement from the aircraft industry that we could develop the radio for aircraft use.

However, we got the idea that there might be something in it in the future; you never can tell. And so we thought the only way to develop this aircraft radio was to hold out the money, and let people see it, and then they would get busy and try to make something.

So the Secretary authorized us to make a requisition for aircraft radio sets—50 radio sets, I believe it was. That was considered a large number before the war. We used to buy less than that in a year.

And we were authorized by the Secretary to get bids on them and require the different bidders to submit samples. And we had keen interest in the matter; and I think there were some six or seven samples submitted.

That was the first advance ever made in aircraft radio sets in this country, and that was produced by our initiative in offering to buy sets if people could produce them. We did that in order to advance the art. And some of the gentlemen here this morning were among those who submitted the first bids—and we thought they were fine at the time. They could work some 75 or 80 miles; they weighed very much more than a similar apparatus weighs now.

Then the aviators were given these sets, and they found that they could make use of them, and we installed them, and that opened up the field, and then we ordered more.

Now, if we had not done that we would have been absolutely unprepared in this war, and I beg to say that we would not have had an aircraft radio set delivered before the war was over.

And that shows where, through our encouragement of the inventive genius of the country, we have aided in developing this matter.

Mr. SAUNDERS. Are you speaking now of the radiotelegraphy or radiotelephony?

Commander HOOPER. We class both radiotelegraphy and radiotelephony together; it is all in radio.

Mr. SAUNDERS. Well, I used to read about the progress of that art long before the United States came into the war—about the aeroplanes of the European nations were using radio for signaling purposes.

Commander HOOPER. That was for a very short range.

Mr. SAUNDERS. Well, they were using it, anyhow.

Commander HOOPER. And our problem was for long-distance scouting, you see.

Mr. SAUNDERS. Well, it has been a gradual improvement in the instruments used, has it not?

Commander HOOPER. I will not say that. We developed ours independently of the people abroad. We deserve the credit—I do not mean the Government, but the inventors.

Mr. HARDY. The American inventors?

Commander HOOPER. Yes, sir.

Mr. SAUNDERS. Then, those people abroad have got the wireless with the radius that you have mentioned?

Commander HOOPER. They have it now, but it is no better than ours.

Mr. SAUNDERS. Well, they developed it, did they not?

Commander HOOPER. Yes; they developed it also.

Mr. EDMONDS. Has there ever been any advance in the art made by an employee of the Navy Department?

Commander HOOPER. Yes; lots of them.

Mr. EDMONDS. Will you please mention a few?

Commander HOOPER. I do not know that I could mention any offhand.

Mr. EDMONDS. Why, if there have been lots of them you ought to be able to name some.

Commander HOOPER. I can say that in this aircraft business we told the inventors just what to do and outlined how to do it, and we deserve about half of the credit of getting the thing up. If we had not done that, they would never have made the effort and produced the inventions.

Mr. ROWE. You found out what you wanted, did you not?

Commander HOOPER. Yes.

Mr. EDMONDS. The probabilities are that you did that very thing, and you deserve credit for it, but I am asking you whether any employee of the Navy Department has ever made any important invention that has advanced the art?

Commander HOOPER. Dr. Kolster, of the Bureau of Standards, got up what we call the "radio compass."

Mr. EDMONDS. Well, he is not in the Navy Department.

Commander HOOPER. Well, we all worked together. It was made at our instigation, the same as the radio for aircraft. We said it would be a good thing to get up a radiocompass. They had a radio-compass before that which was never satisfactory for ships. So we decided that we would try to stir up a lot of enthusiasm about it, and the man who happened to do it happened to be a Government employee. He was just as much in the Government service as our employees are. The Bureau of Standards has always cooperated with us absolutely and efficiently—

Mr. EDMONDS (interposing). I believe that the man who invented that apparatus to cut out the static interference was employed by your department, was he not, and also employed by the Marconi Co.?

Commander HOOPER. Well, I will not say that. I would say that we did as much to invent that as he did, and I am not sure—

Mr. EDMONDS (interposing). Well he got the patent, did he not?

Commander HOOPER. We got the patent on our invention and he got the patent on his. I am not sure that ours is not better than his. That is an honest conviction.

Mr. HARDY. When you go into the Government employ, what you do does not count anyhow. [Laughter.]

Commander HOOPER. Yes, sir.

The CHAIRMAN. No; not in the estimation of some people.

Mr. HARDY. It is generally discounted anyhow.

Commander HOOPER. Well, in the radiotelephone the Government does not want to take credit for what it has not done, but it ought to get credit for what it has done.

Now, we started with the radio telephone years and years ago, and we got the Western Electric Co. to take an interest in it, and they had made the telephones used on our ships, which were satisfactory, although previous to that we had the unsatisfactory telephones made by another concern, and this development work was carried on for a period of several years, until it finally reached a point where, when the war broke out, it could be made useful in all sorts of ways, espe-

cially on the aircraft; and if we had not taken the interest in pushing them along and trying to advance the art, I do not think that would have happened, at least for ship phones.

I read in the newspapers the other day that somebody had advertised that the Government had done all this and that the radio-telephone was the wonderful invention that the Government had made.

And I would like to take occasion to say that the Government did not make that invention; that the Western Electric Co. and the General Electric Co. and the De Forrest and Marconi companies, and some other companies are the ones that deserve the credit for the radiotelephone.

The Western Electric Co. is the one that particularly developed it for the war use. We have been active in pushing the development and it is a fact that as we have handled it it has developed faster than it could have developed with a commercial monopoly doing it.

Mr. WHITE. Is it not true that everybody has been offering such suggestions as they could to your bureau and every bureau of the Government during the war time?

Commander HOOPER. Yes.

Mr. WHITE. I know that is one of the things that Congressmen have been deluged with—offers of all sorts of inventions to aid in carrying on this war.

Commander HOOPER. Well, I was speaking about previous to the war more than about during the war. Most of these things started before the war. We have been pushing the inventors right along. In our Navy we were in competition with other nations and we had to be very keen in order to keep up. And in the last hearing on a bill similar to this the opponents of the bill got up and made the committee believe, or led them to believe, that the Government wanted to manufacture the radio apparatus; that nobody else would be allowed to manufacture anything pertaining to it.

We have not any idea of that kind in the world. We know that the genius of the country should be encouraged and that the manufacture should be done by outsiders.

And we are not anxious to go into that; we are trying to keep from it. There is always a pressure to do the manufacturing within the service to some extent, but we realize our responsibilities and we realize that the development of the art will be very much more satisfactory if it is done on the outside. When we want anything done we tell the people on the outside what we want, and they produce it.

Mr. EDMONDS. As a matter of course, many of these ingenious men who make these inventions and work out their ideas have not got the money to protect them.

Commander HOOPER. That is true.

Mr. EDMONDS. And then you step in and give them a lift and help them out, do you?

Commander HOOPER. Yes; nobody else could do so.

Mr. EDMONDS. No; the probabilities are that nobody else would; and you deserve a great deal of credit along that line and I do not want to depreciate or deny your efforts in that direction. The only thing I wanted to draw out was whether your own men had invented

anything or done anything that could be considered as a tremendous advance in the art.

Commander HOOPER. Well, I should say that we could make claims to patents that would appeal to people. If they were represented properly, they would be considered very valuable, and the Government would have had to buy those patents if those men had not been in the Government service.

Mr. EDMONDS. Well, the improvement that you have made in these things, from the crude article that the inventor has first developed, the improvements that you have made would be patentable, and the department deserves credit for everything of that kind that it has done.

Commander HOOPER. Yes. And the thing that we patent nobody thinks amounts to anything. They say, "That is a simple matter," whereas if some outsider invents a similar article, he wants a million dollars for it right away.

Mr. SAUNDERS. With regard to the substance of this situation, as you have stated it, it is about this, is it not? That here is a situation in which the American people need in this particular field the very best that the inventive genius of American inventors can produce?

Commander HOOPER. Yes, sir.

Mr. SAUNDERS. And Congress without stint provided the funds to get it, and, as was your duty, you used those funds to get it, and technical men in the Navy helped it along. That is about all this situation amounts to, is it not?

Commander HOOPER. No, sir; you are speaking of the war now—

Mr. SAUNDERS. I am speaking now about the war period.

Commander HOOPER. No, sir; during the war was no different.

Mr. SAUNDERS. Yes; during the war you had more funds than you ever had before.

Commander HOOPER. No, sir.

Mr. SAUNDERS. Those large funds?

Commander HOOPER. The requisitions for those aircraft sets and radio compasses were made before the war.

Mr. SAUNDERS. I am not talking about any particular features.

Commander HOOPER. Those were the two most important things and they were developed before the war.

And the fact is, if you take the history of the high-power stations—if you will bear with me I will explain how we have always pushed ahead of the commercial people:

Originally we used what is called the spark type of apparatus in the high-power station. That was developed in this country, among others, by the Marconi Co., and they made it their standard. Along about 1910 we wanted to build a high-power radio station in the Canal Zone, and we advertised for bids for the apparatus, and the so-called continuous wave system was bid on by one of the companies, a new company that had never furnished apparatus to the Government before, this being a new invention at that time, an improvement on the spark apparatus, which was broader tuned; it was not so efficient; it would not carry so far.

The rival bidders tried in every way to keep us from making the award on the basis of this new type of apparatus, which was an advance, in every way they could—that is, in every honest way. I do *not mean to say* they used improper pressure, but they wrote long

letters about the subject and represented to the Secretary that their apparatus was as good as the other.

And we used our best judgment—at least, the department did; I was not there at the time—and decided to adopt what we thought was the best apparatus after we had made a series of tests with it.

So that there was a marked step in advance. That same continuous wave apparatus now is recognized the world over as the best apparatus, and we have put it in our transoceanic systems.

Mr. EDMONDS. Whose invention was that continuous wave apparatus?

Commander HOOPER. That was the Poulsen system.

Mr. EDMONDS. The Poulsen system? What is that?

Commander HOOPER. Yes; it was invented by a Norwegian—or I believe it was a Dane—and was purchased by the Federal Telegraph Co., of San Francisco.

Mr. SAUNDERS. Well, the Federal Telegraph Co. was not a Government system, was it?

Commander HOOPER. No, sir.

Mr. SAUNDERS. That was a commercial enterprise, then, that had this very desirable invention of Poulsen?

Commander HOOPER. Yes, sir; but if it had not been for us they would not have been able to do anything with it at all; and we just pulled them out of the fire, and showed it before the world as an improvement in the art.

Mr. SAUNDERS. Let me ask you this question, so as to get it into the record, because we have had something about this before, and I want to get the respective contentions of both sides into the record, and make a clear issue on the point: Do I understand correctly that you maintain that before the war the efficiency and advance of the radio art in the Navy was greater at that time than was manifested in the commercial world?

Commander HOOPER. Yes.

Mr. SAUNDERS. Do you make that distinct claim?

Commander HOOPER. Yes, sir; there is no question about it. The reason was that the commercial companies could not afford to keep replacing their apparatus with the latest types; they must standardize; whereas the Government must improve, from a military point of view, because we must keep our Navy competing with the other navies of the world; and if we have got a gun, or an engine, or a radio set that is not as good as the very latest thing in other countries, we are not the equal of our possible enemies in efficiency, and we are not as ready to meet them on an even basis as we ought to be.

Mr. SAUNDERS. Were you doing commercial business before the war?

Commander HOOPER. Yes, sir; we were doing commercial business down south of Cape Hatteras.

Mr. SAUNDERS. Then anyone desiring to send a radiograph before the war could send it through the naval stations, could they?

Commander HOOPER. All those south of Hatteras—am I right about that, Capt. Todd?

Capt. TODD. Yes.

The CHAIRMAN. The law provides for that.

Mr. SAUNDERS. I know the law provides for that; but I wanted to find out if they were doing it in a commercial way. We had that

question up yesterday; the law authorizes it, but it does not follow that they were doing it.

The CHAIRMAN. The law itself would show that.

Commander HOOPER. I can give you many other examples of cases where we have pushed the development of the art—

Mr. SAUNDERS (interposing). I want to ask you this: You say that those stations south of Hatteras prior to the war were freely open for commercial use?

Commander HOOPER. Certain of them were, and certain of them were not; some were reserved for Government business, because we could not handle both.

Mr. SAUNDERS. That leaves it in rather an indeterminate situation. I am trying to bring out to what extent in that area you were doing general commercial work before the war.

Capt. TODD. May I answer that question?

Mr. SAUNDERS. Yes; I will be glad to get that for the record.

Capt. TODD. There were no stations that were not handling commercial business south of Hatteras as a—

Mr. SAUNDERS (interposing). I understood Commander Hooper to say that some were and some were not. Then, that was a mistake; they all were?

Commander HOOPER. I withdraw that statement.

Mr. SAUNDERS. I understand. I wanted to get the record straight. Then, all south of Cape Hatteras were doing commercial business, were they?

Capt. TODD. All south of Cape Hatteras, except where specifically prohibited in the law of 1912, and that meant that in case a commercial station within 100 miles of a naval station was open for the general public service between ship and shore, 24 hours of the day, then the naval station had to keep quiet.

But wherever the commercial stations did not operate a 24-hour schedule the naval stations not only south of Hatteras on this coast but on the Pacific coast and throughout our island possessions, did handle the work with the commercial ships exactly the same as commercial stations all over the world.

Mr. SAUNDERS. Freely, in competition with commercial stations?

Capt. TODD. Not in competition with commercial stations, because the commercial stations did not find it practicable to maintain a service which safety at sea, combined with the needs of ships and their passengers required—all except high-power stations.

Mr. SAUNDERS. Well, what service outside of that did the commercial stations do—if you exclude from that, what sort of work would they undertake to do?

Capt. TODD. They have their stations open at the time when they get the most business; they know that certain ships will enter certain ports at certain times, and then there will be a flood of messages. They were careful to have one or two operators to cover those periods. In New Orleans, speaking of the territory south of Hatteras, it was possible to maintain a 24-hour service by commercial stations, with the result that the naval station did not handle any commercial business until the war.

Mr. SAUNDERS. Now, if those commercial stations were open to commercial business, as indicated, and gave better service than the ordinary commercial station could give, it would seem to be a very

clear conclusion that they would run the commercial stations out of business; nobody can compete with a poor service as against a superior service.

Capt. TODD. Well, as a practical matter, the Navy has acquired their station; in other words, it was not practicable for the commercial station to continue, and they have sold their stations voluntarily to the Navy Department.

Mr. SAUNDERS. Just one question in that connection: Have those people gone out of business as a result of the fact that they were affording an inferior service, which could not compete with the Navy, or as the result of restrictions or regulations put upon them so that they could not enter upon full and free commercial use?

Capt. TODD. There were no restrictions upon the erection of commercial stations. Anybody could put up a commercial station anywhere and demand a license, and get it, and operate for commercial profits. There was simply not enough in it to make it profitable.

Mr. SAUNDERS. So that it was the condition of competition that squeezed out those stations?

Mr. WHITE. That is what I want to know.

Capt. TODD. Yes.

Mr. SAUNDERS. Now, if it was competition that squeezed out those stations, where are the stations which the Navy Department should take over?

Capt. TODD. Principally the high-power stations.

Mr. SAUNDERS. With respect to the high-power stations, would not the same conditions prevail? They are commercial stations, are they not?

Capt. TODD. They are commercial stations, but they are not specifically covered in the law you passed in 1912. The law of 1912 made this provision for the handling of commercial work between ship and shore; the overseas work was not specifically covered.

Mr. SAUNDERS. Do you mean by that that the naval overseas high-power stations are not competing with the commercial high-power stations?

Capt. TODD. They are not, and can not, and will be kept idle—

Mr. SAUNDERS (interposing). Then, if we should just allow you to do commercial work with respect to those high-power stations, automatically, just as you squeezed out those other stations, by operating a superior service, you would automatically squeeze out these high power stations?

Capt. TODD. That is a possibility, if we maintained superior service.

Mr. SAUNDERS (continuing). Without being troubled with this matter of Government ownership and the exclusion of private enterprise?

Capt. TODD. If we maintain superior service, naturally we will handle more business; but it would be many years before we would monopolize it all.

Mr. SAUNDERS. Let me ask you one question in that connection, brought out by statements made yesterday before the committee, as I understood them; let me see if I got them correctly; I understood that we have about as many high-power stations on our coasts as can be effectively operated; in other words, the field is about exhausted. Was I correct in that apprehension?

Capt. TODD. In the present state of the art considering the contemplated new high-power stations.

Mr. SAUNDERS. In other words, then, your contention is, that so far as our coast is concerned, it is not a field that is capable of further development by the erection of further high-power stations until the art advances?

Capt. TODD. That is just about right; sir.

Mr. WHITE. Well, my question is very similar to Mr. Saunders's last question. You spoke about this service being unprofitable to the commercial companies, Capt. Todd. I just wanted to get clearly in my mind whether that is because of anything inherent in the nature of the business, or whether it was unprofitable when they undertook to do it in competition with the Government. Is not the reason that the business was unprofitable, and that private companies had to face Government competition?

Capt. TODD. No, sir; because, except in certain cases which are very clear; that is, stations of very great strategical value to the Government from a national point of view, and a small limit around the Government station, the commercial station could not be put within 5 miles, I believe, of the Government station. All commercial companies were perfectly free to put up stations anywhere; and their erection and operation would automatically close the nearest Government station to commercial business. That was the provision of the law you gentlemen passed—with the exception of some stations that I believe I can mention offhand—Key West; San Juan, P. R.; Canal Zone; San Diego; Puget station, in the northwest corner of Washington; and the stations in Alaska and the Philippines; all other stations at which Congress allowed the Government to handle commercial business would be closed to commercial business automatically by the erection of stations in those localities.

So that if there is any money in it, the Marconi Co., or any other company, was perfectly free to erect stations and take the business away from the Government—if they found it practicable. But it was profitable only in the neighborhood of the largest seaports; and all the largest seaports are north of Hatteras. Of course, the stations around San Francisco handled no commercial business, because that is a large seaport; there the commercial companies had their 24-hour schedule, and had a monopoly.

Mr. SAUNDERS. And I believe that my apprehension was further correct, that you contemplate that there is no occasion for and no likelihood of the development of this art in the interior communication of continental United States?

Capt. TODD. I do not remember talking about that.

Mr. SAUNDERS. I do not know that you made that statement, but I think that was developed, because I asked those questions. Certainly the effect of this bill excludes the possibility of that; and it was certainly outlined here yesterday by some witness that you did not contemplate that that would be a practicable or a likely development—small stations dotted all about the United States—that a single enterprise or one of a chain of enterprises wanted to use for their own purposes, or that two cities wanted to use for communicating with each other.

Capt. TODD. If there could be no interference there would be no reasonable excuse for refusing a license.

Mr. SAUNDERS. Well, but you have hampered the issuing of your license, under this bill, so that it would be very difficult for anybody to get a license.

Capt. TODD. I did not quite understand that.

Mr. SAUNDERS. I say that you have hampered the issuing of licenses, under the terms of this bill, so that it would be very difficult for anybody to get a license.

Capt. TODD. It would not be difficult, under the terms of the bill, at all, sir. And may I suggest this? Not only must two stations working in the interior of the country not interfere with ship-to-shore communication, thereby robbing the ships of their only means of communication beyond the visual range, but the Government must also protect itself from groups of stations, and see that they do not interfere with other groups of stations, and so on.

Mr. SAUNDERS. Well, I understood you did not contemplate putting any restrictions on amateurs, and you said that any danger from that source would be eliminated by the wave lengths that you prescribed for them?

Capt. TODD. Yes, sir; there is a very practicable limitation for them.

Mr. SAUNDERS. Well, the same limitation as to wave lengths, as you have outlined as to amateurs, could be prescribed for these interior stations, so as to eliminate any possible interference by them with shore-to-ship or transoceanic signaling?

Capt. TODD. Yes; but it could not be done. If they have the status of amateur stations they are properly regulated so that they can not interfere; but for long distances, such as you suggest—the average cities, of course, are close together, and the amateur waves would do for them, and there is no objection to that. But it is not possible to grant them higher wave lengths and higher powers—

Mr. SAUNDERS (interposing). Well, I do not suppose that any member of this committee holds any other view than that appropriate legislation should be enacted which will prevent any sort of commercial system of wireless from interfering with an efficient sea service. We are all agreed on that. That is a matter of regulation.

Now, you stated that there would be no danger of their not being able to get licenses in proper cases. I have mentioned a case of where a man wanted to put up a set of stations for a chain of factories for the purpose of communication between the different ones.

Section 5 of the bill provides—

That the Secretary of the Navy may issue special licenses, subject to such conditions and restrictions, and for such periods as he deems proper, for the establishment and operation of stations for special emergency use in cases where no other rapid means of communication are available.

I submit that with that language in the bill a set of cotton factories in the South, or other kind of factories in the North or West, who wanted, for their personal use, to set up a small wireless system, would have very great difficulty in getting a license.

Capt. TODD. May I answer that in this way? Congress must, by legislation, establish some agency to get the best results out of this

art of radiotelegraphy; some office or department of the Government must enforce the laws which Congress passes. Now, if those cotton factories were the only ones who would wish to operate between this system of stations that could not interfere with ship-to-shore communication, well and good. But suppose the fertilizer factories, and the wealthy farmers, and the various associations, either the medical association or any organization of any kind, and the railroads—suppose all of those people wanted to put up their system of stations.

Mr. SAUNDERS. Yes; I am speaking of just such a commercial development as that.

Capt. TODD. Well, should there not be some governmental agency to prevent them from destroying the effectiveness of radiotelegraphy?

Mr. SAUNDERS. Well, that raises another question; that raises the question of regulation. What I said was, does not this bill—and I think you will find it in the hearing of yesterday, that this system of development I have just referred to, development in continental United States, was rather discouraged as a possibility, discouraged as an undesirable thing, not likely to be commercially possible. Now, it seems to me, bringing the general view to it, that it is a development that ought to be allowed, if it can be brought about, and every opportunity ought to be afforded to it.

Capt. TODD. I quite admit that

Mr. SAUNDERS. I do not know whether it can be done or not, but a few years ago we were all agreed that flying was a physically impossible thing.

Capt. TODD. I will answer you in a few words: It can not be done in the present state of the art, and for that reason the telephone and telegraph should be used.

Mr. SAUNDERS. Well, that brings us back to what I said was announced here yesterday on behalf of the office of the Secretary of the Navy.

The CHAIRMAN (interposing). Capt. Todd, it is now 10 minutes to 1 o'clock, and the only purpose for which Commander Hooper gave way was that you might answer the question as to how many southern stations were open for commercial purposes; we have gone far afield from that inquiry now. So that I think it will be well for him to resume his testimony later if it is material to the development of the subject.

But it is now nearly 1 o'clock, and I suggest that we take a recess until 2 o'clock, when Commander Hooper can resume his testimony.

Capt. TODD. May I ask that Mr. Long may take the stand this afternoon?

The CHAIRMAN. Of course, we will hear him if that is the desire.

Commander HOOPER. May I take just a few minutes, Mr. Chairman, to discuss one particular phase of the matter?

The CHAIRMAN. Yes, if you can finish in a very few minutes.

Commander HOOPER. I just want to say that the development of the art is entirely outside the scope of the bill and is a thing that the bill does not have anything to do with. We are not going to interfere with the invention or the manufacture of radio; we are just going to let it go on like it has in the past, and have freedom of development in every way.

Mr. GREENE. The manufacture is not to be carried on in connection with the apparatus for ships?

Commander HOOPER. We have a certain amount of manufacture of our own, but we would rather not do it; we would prefer getting it done outside. We are rather narrow in the Navy in some respects.

But we are all working together in the same field and we are all trying to solve the same problem; and perhaps we are not likely to see a broad thing, and so we encourage everybody to do what they can to develop the art. And the development of the art has not anything to do with this bill at all. That is my idea of it. I am speaking absolutely what I think; and I think I have a broad view of the situation from both sides. I am not recommending any monopoly where they will be any restriction or any curbing of competition or of development.

(Thereupon, at 12.50 p. m., the committee took a recess until 2 o'clock p. m.)

AFTER RECESS.

The committee reassembled at the expiration of the recess.

The CHAIRMAN. We will proceed with the hearing. Mr. Breckinridge Long, the Third Assistant Secretary of State, is here. His work at the department is urgent; and, if there is no objection, we will hear Mr. Long at this time.

STATEMENT OF HON. BRECKINRIDGE LONG, THIRD ASSISTANT SECRETARY OF STATE.

The CHAIRMAN. Mr. Secretary, the committee has under consideration H. R. 13159, a bill to further regulate radio communication. I understand you are here to make a statement on behalf of the State Department.

Mr. LONG. Yes, sir; the State Department desired to express its entire approval of the bill as drawn, in substance. There will be forwarded to you, Mr. Chairman, for your committee, a formal communication from the State Department, which will set out very shortly one or two suggestions that the department makes from a legal point of view. But from the point of view of general principles, the department is thoroughly in sympathy with the bill.

There are several reasons which underlie the attitude of the department, but the primary reason is the international one and its specific application to communications to and from this country during wars—during wars in which we are engaged and during wars in which we are neutral.

During the present war—for peace has not yet been declared—we have found occasion to exercise a censorship more or less vigorous, which could not have been done without a certain amount of control of the avenues of communication. During our period of neutrality we found ourselves in a very embarrassing position at times, because of the attempts on the part of other Governments to use stations which they owned, contrary to what we conceived to be to the interests of this Government; and it is for the purpose of regulating these means of communication, both during periods of neutrality,

and during periods of belligerency, that the State Department feels it advisable to vest control of the communications in the executive branch of the Government.

The CHAIRMAN. The European war began in August, 1914. Under the provisions of the radio act, in the event of public emergency or war, the Government has power to take over the control of communication by radio; and, in the exercise of that power, the Government did take over the control of all of the wireless plants in this country. Has there been any lack of power in the Government under the existing law to do that? In other words, has it not been complete?

Mr. LONG. As far as I know, it has, Mr. Chairman. But the State Department is not technically concerned in these questions, and I can not say whether or not it has been complete from a technical point of view. I am only speaking from the point of view of policy.

Mr. WHITE. Would the State Department be concerned, Mr. Long, in anything other than the high-power stations, which communicate from here across the water—that is, you would have no concern, would you, in what we may call continental communication here between points in the United States?

Mr. LONG. Well, if I am properly informed, wireless telegraphy has advanced to such a high degree of scientific use and efficiency that receiving stations are now easily transported in articles and bundles the size of trunks—not much larger, certainly—and can be set up in unknown and unobservable places and can be used to pick out of the air messages that come from very distant places.

Mr. WHITE. Yes; and that is the interest of the State Department in that kind of message. For illustration, if the Pennsylvania Railroad system wanted to control the movement of its trains by wireless between points in this country, the State Department would not have any interest in that. It is only the foreign communications in which you are interested?

Mr. LONG. Oh, yes; we are only interested in foreign communication, or such means as may be used to receive or to send communications to foreign lands.

Mr. HARDY. You would be interested also in communication with foreign vessels at sea, would you not? That is, you might be?

Mr. LONG. Oh, yes; very much.

Mr. EDMONDS. The State Department is not interested in developing wireless in other countries besides the United States?

Mr. LONG. No, we are not.

Mr. EDMONDS. The question was asked Capt. Todd this morning and he stated that that would come under the State Department. The question was asked him whether they were interested in establishing wireless stations in South American countries.

Mr. LONG. Well, we are not at present, and, so far as I know, have not been in communication with any South or Central American countries for the purpose of establishing wireless plants.

Mr. EDMONDS. You have not offered to assist any government financially in building wireless plants?

Mr. LONG. As far as I know, the answer is negative, except possibly in the case of Brazil, which was done during the war, inasmuch as Brazil was a cobelligerent, simply for war purposes and simply.

as a temporary proposition, not to establish a wireless plant there but simply to help them man such plants as they had.

Mr. EDMONDS. You do not know of any negotiations with any of those countries to help them establish wireless communication in connection with our system?

Mr. LONG. No, sir.

Mr. GREENE. Are you in any way effected by or interested in questions of commercial development which it is proposed to carry into effect by the use of wireless if we pass this bill and put into the hands of the Navy Department the power to control and regulate the use of wireless?

Mr. LONG. By "commercial use," do you mean, sir, the use for paid messages or the development of our foreign trade?

Mr. GREENE. Yes; paid messages.

Mr. LONG. Or both?

Mr. GREENE. Both.

Mr. LONG. I do not think we would have any particular concern in just commercial messages, except in so far as they might be used, or the system might be used, to help out foreign trade.

Mr. GREENE. Well, at the present time the Department of Commerce has that matter in control. This would transfer it from the Department of Commerce to the Department of the Navy, the Department of Commerce not having been liberally dealt with in the matter of money by the administration in power. The point I want to make is this, that the Department of Commerce has been broadly interested in trade and the development of foreign affairs; they issue trade notices and have men employed outside of the consulates of the United States who originally were intended for the development of trade.

I do not speak of this on account of any interest that I have, because I am not interested at all in foreign trade, or interested in trade in any way, and am entirely independent of anything of that kind. What I want to get at is whether or not you would think that a transfer of those commercial interests which have heretofore been under the Department of Commerce would be advisable for the development of foreign trade—to transfer it to a department like the Navy Department, that has never been engaged in the development of business, but rather has been engaged in the development of the Navy.

Mr. LONG. As I understand the bill, Mr. Greene, it would not transfer the control of trade or commercial operations to the Department of the Navy, but simply create the Navy as an agency through which commercial messages, or any other messages, might be sent.

Mr. GREENE. Well, I think they would be pretty likely to be considerably interested in trade after they have handled commercial messages for some time. I do not see how anybody would not be interested. I am interested in it, and I never was in foreign trade, never was in a foreign port, never was outside of America so far as being out of sight of land—I never was outside of the United States. I am a strong American; not in any way involved in foreign trade, except that in my position as a member of the House I am interested in anything that means the development of the United States or the development of the Navy—I have always supported everything for them—and, naturally, the interests of the State Department and every department. Now, their proposition is to take all business

operations and put them under one head, one monopoly—they, themselves, call it a monopoly—to put into the hands of the Navy Department the entire monopoly of the radio business to the exclusion of anybody else. They have bought most of the apparatus of various companies and wiped them out of business and then want to get the rest of the control by this legislation.

The CHAIRMAN. I understand that, looking at it from a broad point of view, the State Department approves the policy that is sought to be developed and carried out by this bill?

Mr. LONG. Approves the policies—

The CHAIRMAN. The legislation embodied in this bill.

Mr. LONG. Yes, sir.

Mr. EDMONDS. All that you said that was necessary in connection with your department and radio business, could it not be carried out by regulation just as well as by public ownership?

Mr. LONG. By Executive regulation?

Mr. EDMONDS. By Executive regulation—either by act of Congress or, if necessary, by Executive regulation. Of course, in time of war it is fully covered. Now, in time of peace, would not your interest be just as well cared for by regulation if the plants are privately owned?

Mr. LONG. I doubt that. I doubt the authority to regulate in time of peace.

Mr. EDMONDS. We have had regulation in time of peace; we have regulated it. We licensed every station, and we can take away their licenses. We can revoke them if they do not behave themselves. We have the power of regulating interstate business, and this is interstate business.

Mr. LONG. Yes; you have the power to regulate interstate business by congressional action.

Mr. EDMONDS. Very well, then, by congressional action. We can frame those acts.

Mr. LONG. Yes, sir.

Mr. EDMONDS. And we can regulate this just as well in private ownership as in public ownership.

Mr. LONG. By congressional act I think you can regulate it. I think this would be simply authority to one of the divisions of the executive branch of the Government to regulate it. I think the regulation could be done just as well by congressional act as it could be by a department of the Government, except that when it is done it is a very firm and rigid regulation which can not be framed readily to meet changing situations.

Mr. EDMONDS. Well, we have had probably the greatest number of changing situations existing during this war that we will ever have in our lifetime, and yet you have found the laws passed by this Congress to be absolutely perfect in your handling of the wireless. You have not needed any more law. You have not asked for any more law. You did not come in here and ask us for anything. Why? Because you found the laws on the statute books gave you all the power you would ask for. And if that is not enough we can pass other regulations.

Now, I am only asking this question. We can regulate by act of Congress, and you know we can, the private owners of this wireless

apparatus, and in that case we would not have to pass a public-ownership bill. This bill creates public monopoly.

Mr. LONG. It creates public monopoly, yes; but the premise is that the medium of operation of wireless is the air, and the air is not susceptible of control by any power known, and the only way to direct the use of the air is to control the instruments through which the messages are received.

Mr. EDMONDS. You brought up the question of a man being able to carry in a small package the apparatus with which to receive messages. No matter what Government regulation we provide, even if the Government owned all the wireless apparatus, we could not prevent that man from doing that very thing, because he can make an apparatus himself that would do that, and he could come down here and sit in one of the parks in Washington and take all the messages from the Arlington station or the different wireless stations just the same. Government ownership has nothing to do with that at all. If a man is going to be a traitor to his country in time of war and he wants to get that message, he can get it without any trouble.

Mr. HARDY. Do you think it likely that this Government, under any administration, would ever sell or dispose of its own naval wireless stations to private corporations?

Mr. LONG. I do not know that I have any right to have an opinion on that subject. It is rather a naval matter than a State Department matter. My impression would be negative.

Mr. HARDY. Do you think the State Department itself would rather prefer a private corporation engaged in the business for profit to a wireless station owned by the Government?

Mr. LONG. I think the State Department, as a branch of the Government, would have more confidence in a Government-owned organization than it would have in any private organization.

Mr. HARDY. You do not think a private corporation could be quite as close to the Government as its own agency?

Mr. LONG. I think some private corporations could; yes; but as a general proposition a Government agency is a part of the Government.

Mr. HARDY. When a private corporation gets as close to the Government as its own instrumentality the corporation is practically a part of the Government, is it not? [Laughter.]

Mr. HUMPHREYS. The Government did rely upon the cables, owned by private corporations, to communicate with foreign Governments before they got this wireless, did they not?

Mr. LONG. Yes, sir.

Mr. HUMPHREYS. Do you think you could get along better if they owned the cable than you would with the cable being owned by private interests?

Mr. LONG. Well, circumstances are conceivable wherein it might be better.

Mr. HUMPHREYS. In some circumstances it is conceivable it would be.

Mr. EDMONDS. During the war they relied on the cable and after the war was over they took possession of the cable.

Mr. HUMPHREYS. Well, we can hardly draw much of a conclusion from that. A state of war is a very abnormal condition; I am speak-

ing of times of peace. Of course, if we have war you can take all these things anyhow if corporations own them. There is no corporation in this country that is going to be bigger than the Government, in spite of some very interesting speeches that you may listen to occasionally on the stump. The fact is the Government is bigger than any of these corporations and can take over the operation of their business in times of war if the State Department, the War Department, and Congress, and the Government in all its branches think that is wise. We have that power. I am speaking of times of peace.

Mr. WHITE. Do you think there would be less liability or more; that we might have international complication with the several Governments of the world owning and operating these wireless plants than we would have had with private concerns owning and operating them?

Mr. LONG. In time of peace or in time of war?

Mr. WHITE. In time of peace, on account of interference in the passing of messages.

Mr. LONG. Well, I do not think there would be any great trouble in time of peace, but in time of war it is quite conceivable that there would be a great deal of trouble.

Mr. WHITE. There has been a suggestion made here that even in times of peace if stations owned and operated by the United States interfered with the transmission and reduction of messages by stations of another country it might be a cause of friction between the two countries. Would you think there was much merit in that suggestion?

Mr. LONG. Well, I do not see how they can interfere; it may be they can, but I do not know. It is possible, however, that if it should be persistently done it would cause friction.

Mr. HUMPHREYS. May I ask this question, Mr. Secretary? If you are anxious for a message that you are going to send to a foreign Government to be kept secret, would you not prefer to trust its transmission to a cable owned by a private corporation than to send it out into the air by radio owned by the Government?

Mr. LONG. Well, if I was sure my code was all right, I do not think it would make much difference which way it went.

Mr. HUMPHREYS. Of course, if a message is sent out into the air everybody can get it. A man can have an instrument in his garret if he wants to or down in the cellar. If you send a code message there will be a thousand people in the United States who would read it whether they could understand it or not. If you sent it over the cable there would be nobody but the operator of the cable who would get it. So it would be very much safer in the hands of the cable operator under the control of private enterprise than in the case of the radio owned and operated by the Government, would it not?

Mr. LONG. Yes; that is true. Of course, you understand there is a pretty close relationship between the State Department and the Navy Department. The Navy has ships all over the world, and we have our consular and diplomatic officers all over the world, and they are constantly dealing with incidents arising throughout the world. The State Department and the Navy Department, under all administrations and from the time both departments began to exist, have

always been very close, and we very often have occasion to resort to the Navy to send messages for us.

Mr. HUMPHREYS. This is true, is it not, that there are experts, and a number of them, in code deciphering?

Mr. LONG. Yes.

Mr. HUMPHREYS. They hear these code messages sent time and again, and after hearing them so many times they can decipher them. There are experts that can do that fairly well, are there not?

Mr. LONG. I believe there are, that do it fairly well.

Mr. HUMPHREYS. So that even if you send it in code it would be very much safer if you sent it by cable than it would be if you put it out into the air?

Mr. LONG. I think that is true, if you have a code that can be deciphered.

Mr. HUMPHREYS. That is true of all codes, is it not?

Mr. LONG. I am not sure of that, no.

Mr. GREENE. Is it not a fact that during the recent war England and possibly this country also, but England especially, deciphered the German code, and was able to combat much of their work in trying to destroy vessels of the Navy or United States vessels crossing the ocean? I remember reading in the newspapers that they had deciphered these code messages that were sent out by Germany.

Mr. HARDY. As a matter of fact, did the State Department use the wireless during the war at any time, or did it depend upon the cables for trans-Atlantic communication?

Mr. LONG. We nearly always have used the cable.

Mr. HARDY. You have used the wireless when you did not have the cable convenient, or for other reasons?

Mr. LONG. Yes, sir.

Mr. HARDY. To any considerable extent?

Mr. LONG. No, sir.

STATEMENT OF COMMANDER S. C. HOOPER, UNITED STATES NAVY—Resumed.

Commander HOOPER. Mr. Chairman, there is but one more question to discuss as far as the technical bureau is concerned, the matter of the patent situation. This worries us as much as it worries the inventors, and everybody concerned with radio. There is a feeling, which will be brought out, that the inventor will not be properly encouraged and that men that have already obtained patents on radio apparatus will not be properly reimbursed under Government ownership as they might be if the Government did not own the radio.

There is a difference, which must be recognized, between the patent situation as affected by radio art and by ordinary art, such as patents on machinery and other articles where there is no such confliction. In radio we have to recognize the fact that there must be either regulation or ownership of the art in order to overcome interference conditions for if we must regulate it in some way—we must hold it down in some way—and we must restrict its use in some way. The men who get the patents on devices which might be very useful if we did not have to hold it down must suffer in some respects, which would not be true in the case of an ordinary patent on an engine

which does not interfere with any other engine. For example, if you invent an engine and get a patent on it you can sell that engine to anybody that wants to use it, and they can use it.

But with the radio outfit the use is restricted, and some inventor might get up a scheme in connection with radio which would be very valuable if it could be used, but because of various regulations it can not be used in all respects. That is a condition we must realize and we must recognize that it differs from ordinary patent conditions.

Also we must recognize the fact that radio science is such a highly complicated affair that the Patent Office has never been able to keep from granting patents which do not infringe one on another. In fact, there are patents granted, I understand, to several persons which are almost indistinguishable one from another, and it is very difficult for the people who own the patents to obtain redress in the courts and proper remuneration, in the same way that it is difficult for us to convince you gentlemen of the technical features of this bill, because it takes almost a lifetime of study to understand the whole thing. It is a fact that many inventors, especially the Marconi Co., have been held back from proper compensation for the fine inventions they have gotten up because of the impossibility of getting good decisions out of the courts which cover the whole thing. That is another point that needs to be considered.

The third point is that the Government, in order to take advantage of this rapidly evolving art, must be unhindered in the use of these inventions as they come about without waiting to go through the courts to prove these patent claims. Otherwise we would be years and years behind all other nations and would not be able to use the inventions we have. In fact, it takes the life of a patent before it is properly adjudicated so that the man who invents it can get anything out of it. That is a fact that has to be recognized.

Mr. WHITE. Does not that apply to any patent? Would not that apply to an improvement in the mechanism of a gun just as much?

Commander HOOVER. Well, it is easier to get through a court and get a proper decision on a thing like that than it is with a complicated part in radio. I think the radio people would agree to that.

Now, in order to get around that the courts have decided, I believe, that by right of eminent domain the Government can go ahead and use all these things that are invented, and the matter will be straightened out afterwards. That is a very valuable thing to the Government, to the advancement of the art, and to everybody but, at the present time, the poor inventor. That has been decided, and it is up to us to recognize that fact, the fact that radio is different from other arts, and provide some means for straightening it out.

There is another point which comes up and which is particularly true in this radio situation. We are anxious to reimburse the inventor for the patent—the Government should be, I am sure. It is the Government's duty to see that nothing is put in the way of the inventor's getting his proper reimbursement, but it is a fact that the inventors themselves have not the means to go through this long litigation in an effort to have their claims properly adjudicated, and the poor inventor will lose out unless some means is provided for him to get prompt relief.

Thus far the patents that they have been able to get adjudicated have been purchased by companies which are exploiting these patents and which have the backing to really drive them to a conclusion in years and years of time. But are we really interested so much in the companies as we are in the inventors themselves? Should not some regulation be arranged so that the inventor himself would be paid as soon as his device is properly recognized, so that he would not lose out altogether, and not have it so the only people that possibly would ever get anything out of an invention would be the exploiting companies?

Those are facts that should be considered in connection with these peculiar conditions.

The CHAIRMAN. If that situation can be solved, if the inventor himself can be reimbursed for his work, being compelled to turn it over to some company to exploit, it would be the greatest thing in the world to encourage invention in this country, because I think the history of this country will prove that in ninety-nine cases out of a hundred the inventor never profits anything out of his invention.

Commander HOOPER. The opposition will probably claim that this bill affects the poor inventor. It is not the poor inventor that this bill affects. I believe the poor inventor would get more out of it if it were eventually established that the Government was the clearing house for radio than if it were allowed to drift on aimlessly the way it is going, the exploiting companies paying the inventor just as little as they can.

Why should we sympathize with a company which pays a man \$100 for a great invention and then, because they have large means, are able to go through the courts for years and years and finally are able to collect several million dollars damages? What have they done for the art? They are not doing anything particularly for the art; they are merely doing business, a business which is really an illegitimate taking advantage of the man who deserves the credit.

Mr. HARDY. Let me ask you a question along that line. Would litigation by parties opposing the granting of proper patents be rather perfunctory, or would there be more litigation if the Government had it?

Commander HOOPER. There would be hardly any litigation if the Government did it right—and I have a scheme. Of course, you will say the radio should be considered like everything else and follow the same laws, but I have pointed out certain peculiar features, which make the radio different from anything else. And if it is different from anything else that has come about, why not recognize that difference and make the law such that the matter will be corrected and place the responsibility where it belongs?

Up to a short time before the war all of the Government contracts, so far as I know, had a clause in them that the seller of the apparatus must protect the Government from all claims for patent infringements. As a matter of fact the manufacturing concerns had to sign that contract or they did not get any chance to make any money. They would sign that contract in the hope that they could protect themselves, knowing full well time would drag along so that they would probably never be sued by anybody because the companies would be out of business by that time. It was a great relief to these

companies when the Government, especially during the war, removed that clause from its contracts, because of that decision in the case which placed the responsibility on the Government. They placed that responsibility on the Government because the Government, by reason of the power of eminent domain, had a right to order apparatus from anybody. That was the Government's right. That relieved the situation and relieved the manufacturers greatly from worrying about it, because they could sell anything the Government wanted. If the Government wanted the latest thing in radio, we did not have to go the various conflicting patentee claimants and try to straighten out things; we could go ahead and order what we wanted and we could keep the art right up ahead of the times.

Now, it is up to us to take some means to relieve the situation, for we have in that way usurped the patent laws, and because this situation is different from any other, I think it deserves special consideration. The war is over, and the various companies interested in patents have held off from suing the Government and from suing each other, because it would have taken the time of the Government's experts off of their war work, which was the first essential, and we were all combined to try and whip the enemy. So it is up to us now to take the initiative and try to straighten out this mess.

MR. WHITE. May I interrupt you? You have spoken of the right of the Government to exercise the right of eminent domain and take these patent rights. What is the legal authority for that? I should like to have it in the record.

Commander HOOPER. I do not remember exactly who made the decision. Perhaps some gentleman here can tell us. I think Mr. Pumphrey was the attorney in the case.

MR. WALTER H. PUMPHREY. That was the act of 1910, interpreted by the Supreme Court in the case of Marconi Co. v. Simon.

Commander HOOPER. I do not know whether that is final or not; but, anyway, that gives you an idea of the general situation. If we allow it to drift on, there will be continuous litigation, which will be very expensive both to the Government and to all the radio firms, and will bring us nowhere, except that the man who can hold his breath the longest will win out in the end—the man that has the most money. The people who will profit by it will be those who are concerned in the legal part of it.

Now, is it right that we leave the art in such a state that the only people who would profit by the art would be the lawyers and, to some extent, the patent exploitation companies?

MR. EDMONDS. You speak about settling these matters up. Have you any idea what it is going to cost the Government before you get through with it?

Commander HOOPER. I have my ideas, but I believe there are certain things to be considered which will reduce the cost, and, if we do the proper thing, we certainly can keep the cost down. That is the main thing. If we did not have the proper thing in the past, we can make arrangements to have the proper thing in the future.

MR. EDMONDS. Would it go into the millions of dollars?

Commander HOOPER. It will go into the millions of dollars; yes, sir.

MR. EDMONDS. It will cost more to settle the patents than to buy the apparatus, will it not?

Commander HOOPER. Well, the apparatus went into many, many millions of dollars.

Mr. EDMONDS. I mean, to buy the 16 plants that you are proposing to buy in this bill. Mr. Daniels said yesterday it would cost about \$5,000,000.

Commander HOOPER. No, sir; I think the apparatus would, to a very large extent, exceed the cost of protection of the patents.

Mr. EDMONDS. When you bought the Federal wireless, did you buy any patents?

Commander HOOPER. We bought their patents; yes, sir.

Mr. EDMONDS. Did you pay extra for those?

Commander HOOPER. That is really what we bought—the patents.

Mr. EDMONDS. You only paid the one sum, then?

Commander HOOPER. We paid the \$1,600,000.

Mr. EDMONDS. That included their patents?

Commander HOOPER. That included all of their patent rights and radio stations.

Mr. EDMONDS. That included the Fessenden patents?

Commander HOOPER. The Poulsen is one patent that the Government has cleared up in this deal.

Mr. EDMONDS. Has not that been decided in this case here? Did not Mr. Fessenden get the original patent for the long waves?

Commander HOOPER. I do not believe that would cover this. I say I do not believe it, because I have not given each one these cases thorough study since the war.

Mr. EDMONDS. It is pretty evident here that the judge has given Mr. Fessenden absolute control of the basic patents.

Commander HOOPER. The Fessenden patents may be valuable. I will state there is another company that was willing to pay more for those same Poulsen patents than we did.

Mr. EDMONDS. This was a case where your department intervened with some of your employes, was it not? In this case of the International Electric Signaling Co. v. Atlantic Communication Co. you were helping the Atlantic Communication Co.?

Commander HOOPER. We were helping them before the war; yes, sir. Before the war the department endeavored to straighten out some of the patent situation by taking sides and encouraging the litigation to go on so that either one side or the other would win out. We joined sides with either, depending on which one we thought had the most right, and in consideration of the Government's interests.

Mr. WHITE. What is the Atlantic Communication Co.?

Mr. EDMONDS. That was the Telefunken Co.'s branch in this country, was it not?

Commander HOOPER. That was the German Government's indirect branch in this country, it might be said.

Mr. GREENE. The United States helped Germany in that case?

Commander HOOPER. We did, without knowing it. [Laughter.]

Mr. GREENE. It seems to me your sharp intellects ought to have told you you were helping Germany. I can not understand that.

The CHAIRMAN. Our friend lived right down there near Sayville and did not know anything about it. [Laughter.]

Commander HOOPER. That company was incorporated under the laws of the United States in all respects, and there was no evidence of any kind that it was in any way a German company.

Mr. LAZARO. You said you had a scheme to offer?

Commander HOOPER. Yes, sir.

Mr. EDMONDS. The idea you had in sending these men there was just to get some settled decision?

Commander HOOPER. Our idea was to place our evidence before the courts and at the same time look out for the Government's interest.

Mr. EDMONDS. And you sent them there at the expense of the Government?

Commander HOOPER. At the expense of the Government; it does not amount to anything. We wanted to put our evidence in freely and openly, so that the case would come to a head. But even that does not clear the situation. The poor inventor remains absolutely out of it. I would like to see it arranged so that the inventor would be the man that would get the money.

Mr. WHITE. In that connection does your department assume to pass on the conflicting claims of inventors and the persons who claim to own these patent rights?

Commander HOOPER. No, sir; I will explain the idea. The original idea was to bring these cases to a head as far as we could by the Government joining one side or the other. That would bring out all the evidence, and we would be able to let the people go to the Court of Claims. The only thing we would contest would be the price that was paid for the patent. That is to say, if the thing had been decided by the judge the case would go through the Court of Claims very promptly instead of having to wait. But we were merely contesting the price.

But that is not satisfactory, and we have decided, among the departments, to clarify the situation, that this is a matter that our department is interested in, but a matter that the Department of Justice is primarily interested in, because it is a question of the adjudication of patents, and a matter that the War Department is also interested in because they have purchased a good deal of radio apparatus. The flying section of the War Department is also interested. So we have a board appointed now, an interdepartmental board, and that board was appointed several months ago though it has not done much yet because the war is just over. Now that the war is over it is our duty to proceed and try to straighten this tangle out with this board, and the Secretary has ordered that this matter be actively pursued as far as the Navy Department is concerned, and the other departments are proceeding similarly. In a very short time our board will commence sittings. In the mean time we are drawing up a list of all the apparatus we have bought, a list of all the patents that have been violated, and we are going to try to decide in the board just which patents are clear, with the different claimants, and which ones we can settle without our own experts and get an agreement, and we will let them go to the Court of Claims—and it will probably go through without contest.

Mr. EDMONDS. I am informed that there is a resident of Pennsylvania, not a company, just an individual, who has backed this Fessenden patent to the amount of \$1,000,000 or maybe \$2,000,000 actual money. You say these patents are not going to cost you much, but you are going to take away from him all his opportunity

of redress if he can get it under this patent. And if you are going to buy that patent how is he going to get out of it the money he has spent in developing it?

Commander HOOPER. I will answer that in this way. In case we can not agree among ourselves, why then he has the only redress, just the same as any other claimant—he has to go to the Court of Claims and convince them. It is not the Government's fault if any man backs a losing horse in a race. The loser takes the chance.

Mr. EDMONDS. Then you are very liable to spend a great deal more than \$5,000,000 for these patents before you get through?

Commander HOOPER. Well, I am not so sure. Is it not our duty to spend it anyhow if it is coming to them, whatever it may be?

Mr. EDMONDS. It is your duty to spend it, but I think the committee is entitled to know what this is going to cost.

The CHAIRMAN. How can the committee know now? Have you ever had any experience in litigation?

Mr. EDMONDS. Well, we can have some idea about it. The department comes here with this proposition, and they must have an idea of what these things are going to cost.

The CHAIRMAN. Well, it would not be worth a straw, if they expressed an opinion.

Mr. WHITE. But is it not permissible for us to ask about it?

The CHAIRMAN. Yes; but it is not practicable for them to give it.

Mr. LAZARO. I suggest, Mr. Chairman, that the commander give us his opinion in full, and then we can ask him questions.

Commander HOOPER. Well, the question of taking over the stations is a very small part of it. \$5,000,000 is a small part of the apparatus we have bought. We have bought \$30,000,000 or \$50,000,000 worth of radio apparatus. We have to stand for all of that. This \$5,000,000 is a very small part of the total, and I think that is such a small percentage that it should not even be included in the discussion of this bill.

What I am really trying to point out is the fact that something ought to be done, in the way of legislation, to recognize that it is in our hands, or let us try to recognize these inventories.

Mr. HARDY. Well, that is not involved in this bill at all, is it?

Commander HOOPER. I do not think it has any bearing whatsoever on this bill. The only thing is that I am trying to bring it up in advance, before the opponents come around and say that Government ownership will absolutely—

The CHAIRMAN (interposing). I suggest, Commander Hooper, that the orderly way to proceed is to present your own case, let them present theirs, and then you will have leave to present anything in rebuttal that is germane to the merits of this bill.

Commander HOOPER. Yes, sir.

The CHAIRMAN. But do not anticipate. I do not think that is good pleading; and if I was trying a case in court as a lawyer, I would not do it that way.

Commander HOOPER. Well, when I come before you, gentlemen, I feel that I have responsibility for both sides, and I try to put it fairly for both sides.

Mr. EDMONDS. Let me ask you this as to the question of inventions in the future: What stimulus will there be in the future for an in-

ventor to go into the invention of radio apparatus when he has only one customer?

Commander HOOPER. Well, I think that this board of which I have spoken—

Mr. EDMONDS (interposing). No; I am talking about the future.

Commander HOOPER. I know. But the idea is that I think this board is intended to be made continuous, so that instead of having an inventor who has anything to sell take the matter up with the courts or with exploitation companies, he will only go before this board, which is absolutely in touch with all the radio situation, and the relative value of patents, and the history of everything pertaining to the radio art, and the board would be prepared to recommend that he be paid in proportion to the value of his invention to the Government. That would be kept right up to date all the time, otherwise he would have to sell it out cheap to some patent-exploitation company.

Mr. EDMONDS. Well, that has not been true in the past; everybody who has had an invention to sell has not got the short end of it. You were speaking of George Westinghouse a short while ago.

Commander HOOPER. But he is not a radio inventor.

Mr. EDMONDS. I mean that every inventor has not had the short end of it in selling his patents.

Commander HOOPER. Well, the radio people have; there is hardly one of them that has not had the short end of it. You spoke a while ago about the Pennsylvania firm; you said they wanted to get a large sum for their patents. Their inventions were made by Prof. Fessenden—at least I think he is the one that they based their claims on, and he tells me that he never got anything out of them; they gave him stock and never gave him anything else.

Mr. EDMONDS. My understanding is that there has been no stock sold at all; it is simply a case of one man putting up the money for the protection of the invention, I have been told. I do not know whether that is true or not.

Commander HOOPER. Well, that is a good illustration of where the inventor got nothing, and the exploitation company has a good chance to make money out of it.

Mr. EDMONDS. But Prof. Fessenden owns 50 per cent of the stock, and he will get 50 per cent of what the company gets for the patent; and if he owned 10 per cent of the stock he would get 10 per cent.

Commander HOOPER. Well, that is a good example right there. I think the radio people would agree that this board of which I spoke is a proper thing, and that we should straighten out the past and sit continuously in the future and make recommendations.

Mr. EDMONDS. What I am afraid of is that you intend to pay these men arbitrarily what you please, and not pay them on any valuation except what you think will be fair in your own mind.

Commander HOOPER. Well, we have a representative of the Department of Justice on this board. They have a leading part in it, and they are a permanent factor there.

The CHAIRMAN. Well, I would suggest, as that has nothing to do with the bill, in your view, that you pass to something else.

Commander HOOPER. I do not think that it has anything to do with it at all; but I merely wanted to answer some questions that *would reflect on the bill* and show what the facts were.

Mr. WHITE. I am interested in this question of the extent to which the department proposes to interfere or to interest itself—whichever you prefer to call it—between an inventor and a man who claims to have a patent right. Suppose I claim to be an inventor of a radio process and Mr. Edmonds has another process. I claim that he is infringing my process, and I go into court and bring a suit against him for an infringement of my patent right. Am I to understand that the Navy Department will go into court and interest itself, upon one side or the other, in litigation of that sort?

Commander HOOPER. Do you mean is that our idea in the future, or have we done that in the past?

Mr. WHITE. Well, I mean if you have been doing it in the past or propose to do it in the future.

Commander HOOPER. We have been going in on both sides; at least, it has been done, I understand, with the idea of getting the evidence all before the court, and that the Government was a party to the deal as a good business proposition. In other words, the department has in the past assumed that it should take an interest on the side that was to the best advantage of the Government, and not let the Government be robbed absolutely without the Government's having interested itself in the case.

The CHAIRMAN. In other words, these are equitable suits and the Government has intervened as an interested party?

Commander HOOPER. As an interested party.

The CHAIRMAN. Having bought an invention the infringement of which was claimed by one or the other of the parties?

Commander HOOPER. Yes, sir.

The CHAIRMAN. And it is good business that you shall do so?

Mr. EDMONDS. As near as I can understand, the Government did not intervene; the Government went in there in the interest of one side or the other in those cases.

The CHAIRMAN. But the Government had bought the invention. Here was a suit about who was the inventor, who was entitled to the money for an invention; the Government intervened in the case.

Mr. EDMONDS. In the cases that I refer to, the man testified that he was sent there by the Navy Department, at the expense of the Navy Department, to testify in favor of a certain invention belonging to a certain company; that is the way I understood it.

The CHAIRMAN. Well, I would not believe any such statement as that.

Mr. EDMONDS. Well, that was brought out in the testimony—the men testified that, in their opinion as experts, the invention belonged to one of the parties.

The CHAIRMAN. Well, I suppose that was a case where the Government was interested.

Mr. HARDY. It looks to me as if we are trying to try the Government for trying a case. [Laughter.]

Mr. WHITE. I want to find out what the Government does and what it proposes to do. It seems to me that inasmuch as this bill proposes that people who have existing patent rights shall not be permitted to operate under those rights, under this bill, it is germane to this bill to make this inquiry.

The CHAIRMAN. Where is there anything in the bill to that effect? I wish you would point out the provision in the bill that provides that.

Mr. WHITE. The bill proposes to give the Government a monopoly and to give it authority to determine that nobody else shall operate a radio plant in this country.

The CHAIRMAN. How many other purchasers of radio improvement are there in this country?

Mr. WHITE. I do not know.

The CHAIRMAN. The Marconi Co. and the Government are the only two.

Commander HOOPER. That is practically the situation.

The CHAIRMAN. Yes; the Marconi Co. and the Government. And the poor inventor will be between the devil and the deep blue sea—between the Government and that company. [Laughter.]

Mr. ROWE. How will it be when the Government owns the Marconi Co.?

Commander HOOPER. It will be a question just as hard to answer, whether the Government owns or regulates, because under regulation a man is also restricted from operation.

Mr. EDMONDS. Suppose a man gets a patent from the United States Government, he gets the free and exclusive use of that patent for 17 years, does he not?

Commander HOOPER. Yes; but it may not be any good.

Mr. EDMONDS. And then the Government passes an act and makes a monopoly of that business, and he has not any customer to go to to sell it.

Commander HOOPER. Well, it is a monopoly anyway.

Mr. EDMONDS. Well, there are lots of private manufacturers and lots of private radio operators.

Commander HOOPER. Yes; there are so many mixed in that they could not operate, in so far as they depended on the patent situation.

Mr. EDMONDS. I think it is a very hard question to decide, and I think it ought to be decided and settled once for all.

Commander HOOPER. Yes; and I think we can settle it to the advantage of everybody. But if we let it drift the inventors will get so that they will not bother about inventing, and we will not have any improvements.

Mr. EDMONDS. Well, if we pass the bill they will do the same thing.

Mr. BESHIN. That is what they say now—that the passage of this bill will destroy initiative.

The CHAIRMAN. Well, I was a member of the Committee on Patents for years and the ranking member at the beginning of this Congress; and the opinion of the men on that committee was to the effect that the inventor fared badly at all events.

Commander HOOPER. Yes, sir. Now, the Government will try to get the art advanced, and we will offer inducements. We have bought a lot of patents, and the people that we bought them from are the most energetic in trying to produce other inventions; and I think it is good business, and we will all benefit by it, and it will continue; and I think if we are allowed to do it regularly we will be able to become gradually more and more fair.

Mr. EDMONDS. Those energetic people are now in your employ, are they not? [Laughter.]

Commander HOOPER. No, sir.

Mr. EDMONDS. Are they outside the service trying to become inventors?

Commander HOOPER. Yes, sir; some are and some are not.

Mr. EDMONDS. You have some of the Federal people in your employ—quite a few of them—have you not?

Commander HOOPER. We had during the war. We have none in our employ now, excepting where they have gone into the service during the war.

Mr. EDMONDS. What did you do with the operators in the Marconi shore stations and the Federal shore stations?

Commander HOOPER. Most of them joined the Navy.

Mr. EDMONDS. Could they join the Navy? Did they not have to pass a physical examination, or did you just take them in anyhow?

Commander HOOPER. We had to put them through a physical examination.

But you brought up a point yesterday which I think ought to be answered in connection with the bill—about the one-armed soldier coming back and wanting a job and not being able to pass our examination for enlistment—and I think that the Navy, just the same as other departments and private concerns, has a duty to perform to make the requirements such that those men can come in, and I do not think there is any question that it will. There is no reason in the world why a man in a shore station who has one foot gone, or something of the kind, can not do just as good work as the man who has two feet.

Mr. EDMONDS. I understand that there were some 10,000 operators; and, of course, if we could put 1,000 or 2,000 men in a position like that, it would be a very fine position for them and a very valuable thing to do.

Commander HOOPER. Yes, sir; and they would be most loyal and appreciative.

Mr. EDMONDS. I think that is true.

Commander HOOPER. And I think it is highly desirable. I am informed that the Bureau of Medicine and Surgery has just established a precedent in that regard and waived the physical examination of a one-legged operator and allowed him to come in the naval radio service.

Mr. EDMONDS. What has become of the Department of Commerce operators that worked in this service?

Commander HOOPER. They were not operators; they were inspectors, to see that the law was complied with.

Mr. EDMONDS. Are they going to get out of the business now?

Commander HOOPER. I imagine that they will do the same thing for us.

Mr. EDMONDS (continuing). Or will we continue to appropriate for them and have them do nothing?

Commander HOOPER. When the war came on most of them went into the Navy.

Mr. EDMONDS. Will they continue in the Navy, probably?

Commander HOOPER. Yes, sir; we have to keep up this big organization in order to give satisfactory service.

Mr. EDMONDS. Then, if we pass this bill, will we have to pass another one for the Department of Commerce?

Commander HOOPER. I do not think it will be necessary to pass one for the Department of Commerce for radio.

Mr. EDMONDS. Well, even if we did not pass the bill, it would not be necessary, would it?

Commander HOOPER. They would have to take these people from us and put them back on their own work, and perhaps if the men wanted to stay with the Navy they would have to get somebody else.

Mr. EDMONDS. Well, there is considerable duplication in the departments now, and it was about time some of it was cut out.

Commander HOOPER. I think so, too; and I think we are agreed as to that; we had the support of the Department of Commerce on this bill, as we had on the last bill.

Mr. EDMONDS. Well, the Government departments have a habit of keeping what they have and trying to get more.

The CHAIRMAN. We have a report of the Department of Commerce on the bill, which will be submitted to the committee at the proper time. I do not know what their attitude is. In the past, as you say, they have been reluctant to give up everything—the Government departments. (See p. — for this report.)

Mr. EDMONDS. Will you put all the present laws in the hearings?

Commander HOOPER. I will endeavor to do so.

Mr. EDMONDS. I mean all the present laws with regard to regulation, and so on.

Commander HOOPER. Yes, sir.

(The laws referred to appear on pp. —.)

Commander HOOPER (continuing). I think I have brought out all the general features with regard to the patent situation. I know there will be criticism, because if we try to do it fairly some of the exploitation people may suffer. But I think in all business it is a question of give and take, in argument, and finding a proper adjustment in the end. And if people do not give and take it is only right that they should go to the Court of Claims; that is the way it is with all business.

But our idea is to have this thing all adjusted agreeably to everybody, and then they can just go formally to the Court of Claims and get their money without contest, and they will not find any opposition in the Court of Claims. But if they are not reasonable we will say, "All right, we will have to let you go to the court and fight it out, as all others do."

Mr. HARDY. After all, is not an inventor more likely to get justice from a Government monopoly than from a private monopoly?

Commander HOOPER. Absolutely; and I think all the inventors will say so. I do not think all the exploitation people will say so, or, possibly, all the lawyers; but I think the inventors will say so. I believe they would rather take a chance with the Government. Our proposition would result in a gain for the inventors I think, and they would be very enthusiastic about it.

Mr. EDMONDS. I have not seen any of them rushing around here yet to support the bill. [Laughter.]

Mr. GREENE. I would like to ask this question: You are suggesting in this bill that the Government go into the commercial business. Now, I am interested for the country, not for any special person; I do not know anybody in the business that you would be likely to

affect. But if you are going into the commercial business you are going into a pretty broad line. And I want to know, if a call for a radio came before your department, or before your man who had charge of the radio, and a call came before him for commercial business, which would have the preference?

Commander HOOPER. Well, it is our duty to have our stations sufficiently efficient so that there will not be any conflict or delay in either. I think that business would gradually get the preference, because they would insist on it; and we have a civilian Secretary of the Navy, and always will have, and that is an advantage, in having a civilian Secretary of the Navy. I think that would come about more and more if such a condition arose; but I do not think the instance would arise.

Mr. GREENE. My experience is that the civilian Secretary of the Navy succumbs entirely to the Navy men. I do not see that he has any opinion of his own. [Laughter.]

Commander HOOPER. Well, if you would go to the civilian Secretaries, as we always have to do, you would see how hard they are to convince if there is any proposition in which the rights of the public are liable to be taken advantage of.

Mr. Chairman, in connection with this board of ours I do not want to make any promises. I merely state what I think will be an ideal scheme.

Mr. GREENE. I am much obliged for your answer to that, because I asked another witness the question and he dodged it, and I am glad that you are frank enough to state your opinion.

Mr. HUMPHREYS. It would depend upon what, in your judgment, was the relative importance of the two businesses, would it not?

Commander HOOPER. Yes, sir.

Mr. GREENE. Of course, in case of war I would not expect the Navy to give way to anybody, but we are going out of war now and going into peace, and you are proposing to go into a great scheme of business development, and you are going to be greater than anybody else, even on business development, and I want to know where you are going to draw the line in this important matter. You are pretty strong as a Navy now, which I am glad to see, but when you go into another line I want to know how far you are going.

Commander HOOPER. There is another point in favor of the bill which I could bring out. The Government does not intend to own the radio sets on merchant ships. We are not in that business. We have made it possible by the purchase of a large number of the sets that the Shipping Board had to have for their vessels for them to buy their sets where they wanted to buy them. Heretofore they have been forced, because the Marconi Co. had a monopoly on this situation, to license the sets at a high rental, which was, of course, detrimental to them. I mean they should not pay more than is right, but they had to rent their sets from the Marconi Co. at a high rental.

Mr. EDMONDS. I notice in the report of the Shipping Board that they are paying \$6,100 apiece for their wireless. That is what it says in their report. I presume that is the right price.

Commander HOOPER. No, sir; that is not right. They have been paying \$1,000 a year and not owning their sets. Now, we have made it possible for a steamship company to buy a radio set wherever

they want it, just like they buy a winch or anything else. A radio set becomes a part of a ship, and in that way they are not required to pay a high rental.

Mr. EDMONDS. Well, why is not the Shipping Board taking advantage of that when they have been buying wireless outfits at \$6,100 each?

Commander HOOPER. That is not correct. Sometimes we put in for more money than we really need, because we have not much idea of how much it will cost, and then perhaps we do not spend all that money. But we have made it possible for steamship owners to own their sets and to buy them from any concern, and that will be a good thing for a good many manufacturing concerns, and also a great thing for the merchant ships to have that privilege.

Mr. EDMONDS. Will that not interfere with your shore stations if you have all kinds of apparatus?

Commander HOOPER. No, sir. Of course the apparatus is all standardized by law, the same as before.

Mr. EDMONDS. Do all the operators on the merchant ships have to pass examinations?

Commander HOOPER. Yes, sir; all have to pass examinations, and it is just a question of having them licensed by one department rather than by another.

Mr. EDMONDS. You do not have any naval operators on the merchant ships, do you?

Commander HOOPER. During the war we have had, but it is not the intention to retain them, as I understand, although I believe it would be better if they were all in the Naval Reserve, so that if war came on us suddenly we would have given them a certain amount of instruction in the Naval Reserve, but not in the active service. That is to say, if we would have the power of eliminating certain undesirable foreigners we would prevent spies going on American ships, and in that way could arrange some way of having them instructed in our forms, so that would use them occasionally and be ready for war when it occurred.

After we took over the merchant service, with our radio operators, it took us months after they were placed on the ships to teach them military procedure, and the whole thing was not efficient for a long time; and probably there were many spies—I do not say “probably”—but there might have been spies on the ships as operators, who could have done tremendous damage.

But nowadays, on the declaration of war, the merchant marine becomes just as much a part of the Navy as a battleship is. A merchant ship has to have a gun, and has to operate in formation with destroyers, and all that sort of thing; and they have to pass overnight into a system which it takes a naval operator a long time to learn about. And if they were in the Naval Reserve they would have the necessary knowledge and skill without further training.

But that has not anything to do with this bill. That would not restrict the employment of operators by steamship companies, wherever they wanted to get them, as long as they passed the requirements with regard to nationality, examinations, etc.; it is necessary to see that they can operate sufficiently for military purposes as well as otherwise. I do not think there would be any objection to that.

Mr. BESHLIN. Did you have any difficulty in getting the requisite number of wireless operators on the outbreak of the war?

Commander HOOPER. We had difficulty in getting good operators. But we established a large school for them at Harvard; that was our principal school. They were kind enough to lend us some of their buildings there; and we have worked up to 5,000 operators in training at a time. But I should say that the efficiency of the service went down about 50 per cent, due to this sudden requirement for military operation on all ships, and it took some time to break them in. Practice is what makes a good operator.

Mr. BESHLIN. How long does it take a man studying wireless, without any previous knowledge of the subject, to become proficient?

Commander HOOPER. Well, a young man can become pretty good as an ordinary commercial operator in, say, six months; he goes to school three or four months. If they are amateurs beforehand, it will be less. But as soon as the Navy takes over a merchant ship, the operators have to learn all sorts of extra things—the naval procedure, the ciphering and handling of secret codes, handling special wave-length arrangements to dodge the enemy's signals, and try to get some degree of secrecy in our messages; and there is a good deal to learn about it which is not just operation, and to become proficient in that a man usually has to have a year or two of service; it depends altogether on the man.

Mr. BESHLIN. You may have answered this question while I was out. There seems to be considerable opposition to this measure on the part of the amateurs, who state, in substance, that it would have a tendency to destroy or discourage initiative and cut out all of that incentive.

Commander HOOPER. Well, I believe that is satisfactorily arranged now in that amendment as it stands; that is my opinion, and I believe the amateurs will say so. But there will always be disagreements, because, naturally, the amateurs would not want any regulation at all if it was not necessary. But I believe those who have heard this discussion will see that we both have to give and take in order to give everybody a chance.

Mr. HUMPHREYS. Do you think the amateurs ought to be limited to the receiving part of the apparatus?

Commander HOOPER. No, sir; I do not think so at all. If an amateur is receiving, he can receive anywhere without interfering with anybody. The only interference that he creates is by sending his communication.

Mr. HUMPHREYS. That is what I say. Do you think he ought to be limited to receiving and be prohibited from sending messages in the air?

Commander HOOPER. They should have no limits in receiving, except that they should be required to take out a license and be properly catalogued, so that we could inspect them, and in case of war know where they were, and also so that we would have an idea as to how many of them there were.

Mr. HUMPHREYS. And the limitation on the sending would be these wave lengths?

Commander HOOPER. Wave lengths and power; yes, sir.

Mr. HUMPHREYS. If we give the Navy the exclusive right to operate these shore stations here, within the limits that are necessary to communicate with ships, and then let the amateurs have this short wave and let the commercial companies, if they want to, operate the trans-Atlantic business would that be sufficient protection, in your opinion?

Commander HOOPER. That would take care of the emergency situation. I do not believe it is the Secretary's idea, however, that we should let the commercial people have the higher-power stations, although it would not injure any particular phase of the situation at the present moment, the idea being that it would be a disadvantage to have the commercial companies build the big stations and then possibly not be able to operate them, because they might all conflict with each other later on, and it would be a waste of their good money. It would only be fair to add that inventive genius may prevent them seriously conflicting in the end, although this is doubtful.

Mr. HUMPHREYS. And then, if we should later take over the whole business, of course, we would have to pay for the installation of the numerous high-power stations that ought never to have been installed; is that correct?

Commander HOOPER. That possibility will develop. I can not say that that will be true; it may be that the art will advance so that these high-power stations will do a great deal that we do not know that they can do now. That is a matter for the future to decide; and I hope that the widest encouragement will be given to inventors, so that they can bring out what the full extent of the art makes possible. And there would be an advantage to transoceanic messages sent by radio, because the cable is a monopoly, and it would be to the general public good to bring cable rates down.

I, myself, think it would be a crime now to permit private companies to open commercial stations to commercial service, both from the standpoint of operation and of efficiency; and the Government will save money by this proposition, which appears to be an objection now, in a way; but when we come back to the normal conditions we will say that it is not a bad thing if we do save money.

Mr. GREENE. Well, it will be a new idea. [Laughter.]

Mr. HUMPHREYS. Let me see if I get your idea correctly: If we give the Navy the exclusive right to operate from ship to ship, and from ship to shore, and then permit them to do commercial business across the ocean if they want to, would that be your idea?

Commander HOOPER. I think that is essentially it. I think we would be throwing money away not to do so; we would have built all of these Government stations and have them all, and not to be allowed to use them for the public good and save the merchant ships all this expense of having to pay for other stations to be put up would be a crime against them.

Mr. HUMPHREYS. Then having done that, would you put any limitation on the right of private interests to establish these high-power stations to carry the transoceanic traffic?

Commander HOOPER. Well, that is a question that Capt. Todd is primarily interested in—the high-power business. I think the Secretary's policy is to take them all. It is not essential that we take them all on account of the interference at present, although, as I say, it would be bad policy if you let the commercial companies go

into it, and then after they had built a lot of expensive stations, they might find that they could not use them because they interfered.

Mr. HUMPHREYS. With each other; that would be a dereliction on the part of the Government. Suppose they transferred all of those stations now to the Department of Commerce, would that be a handicap to the Navy?

Commander HOOPER. I beg your pardon?

Mr. HUMPHREYS. Suppose we were to transfer all of these receiving stations, and all of this radio business, instead of to the Navy to the Department of Commerce; would that be a handicap to the Navy?

Commander HOOPER. Yes; that would be a very great handicap to us, because the military service of the Navy has to have its own stations. We have a continual training system, and the necessity of communication with all our fleets, which could not be properly handled by any other department but the Military Establishment. And we have to own our own stations; and as long as we own them we are the logical ones to own the rest of the stations, because if anybody else did, the stations would conflict with ours.

Mr. HUMPHREYS. Well, I do not get your idea exactly; I wish you would make that a little clearer to me—how it would make any difference to the Navy Department whether the Department of Commerce had control, or the Navy Department had it; you could still send your messages to and fro.

Commander HOOPER. Well, a radio station to us is just the same as a battleship. The battleships and radio stations work together, and they are part of a definite, fixed organization—the Navy personnel and the radio station; we are just as strict about how they use it as we are how they use a battleship. We have certain secret rules, which, in drills, we require them to carry out; and it is absolutely essential to our military organization that we have our own stations. It would just mean that the two departments of the Government would be rivals in the business, instead of having one control it. The Navy Department is the logical one to control it. And having two departments of the Government interested would destroy the monopoly which is essential to efficiency in radio matters.

Mr. EDMONDS. Well, every one of your stations could be turned over to the Department of Commerce, including that at Guam and that in Hawaii, and then you would send your messages through the Department of Commerce.

Commander HOOPER. Yes; but we would not be able to have all of the military arrangements; they would probably not pay any attention to what we desired.

Mr. EDMONDS. Well, they would be fair to you and also to the commercial business; they would do your business part of the time and the commercial business part of the time.

Commander HOOPER. Yes; but there are certain things that are important; we have certain stations picked out to do certain things; to report the movements of enemy ships; to call for information from passing ships to give us an idea of what the enemy is doing, and all that sort of thing; and that requires us to have our own men in charge. And we transfer those men from ship to shore. They are experienced on the ship and know what the ship is up against, and they are used to the ship's strategical maneuvers, so that a man on a shore station can sit at his desk and know what is going on on

the whole ocean; he knows the whole strategical situation. In that way it is of very great advantage to have the men who are acquainted with ships on the shore stations.

Mr. EDMONDS. Well, they could take over the men in the shore stations.

Commander HOOPER. That would be all right until those men got old and left the service and they then took in new men; and we would not have any control of it then. I do not think the Department of Commerce would care to have anything like that. I think they thoroughly approve the Navy's control of wireless.

Mr. BESHLIN. There would be no advantage in doing that anyhow, would there?

Commander HOOPER. No advantage whatever. It has never been asked for; and, in fact, I believe the Department of Commerce—if this is not correct, I hope Capt. Todd will correct me—has offered to let us have the licensing rather than have a duplication of work in the two departments.

Mr. HUMPHREYS. Well, let me ask you, do you think that would be necessary?

Commander HOOPER. What?

Mr. HUMPHREYS. For the Navy to issue the licenses?

Commander HOOPER. Somebody has to do it.

Mr. HUMPHREYS. I know somebody has to do it. But would it interfere with the efficient operation of the system to continue to permit the Department of Commerce to issue licenses?

Commander HOOPER. It would to a certain extent. Anyhow, it would be a duplication of effort. We have all of this force, and we could do it in addition to our other work. It would be hard for some of their inspectors, if they were not all trained in our methods, to see the broad situation, both from a military point of view and a land point of view. I think it would be objectionable both from the standpoint of efficiency and that of undue expense.

Mr. EDMONDS. It would be an advantage to the commercial business to have them know that they were under charge of a department where their business was considered just as important as the Navy business, would it not?

Commander HOOPER. I think the answer to that is that the Navy is now specializing certain officers in radio, who are going to do hardly anything else in a lifetime. We have an arrangement to give certain of the graduates at Annapolis postgraduate courses in wireless and make them efficient in it; and we will be able to do the thing just as well or better than anybody else; and although we are in uniform, our naval training will be only for the purpose of assisting us to cooperate in the whole scheme of things. In other words, we are in the business to do good; and instead of having a changing lot of officers who are inexperienced, we are making arrangements to get and actually have got a number of officers now who do little else but wireless, because that is their business.

Mr. EDMONDS. Can you insert in the record the rate of pay of these radio men in the Navy, their titles and duties, and the total number at the different radio stations; and also what pay the private corporations were giving them before you took them?

Commander HOOPER. That would be more under Capt. Todd's office.

Mr. EDMONDS. Well, you and Capt. Todd can make up such a statement between you.

Commander HOOPER. Yes.

Mr. EDMONDS. And show in it what these men were paid under private operation, how you rate them, and what they are paid under the Navy Department.

Commander HOOPER. Yes.

(The statement referred to appears on p. —.)

The CHAIRMAN. Is that all, Commander Hooper?

Commander HOOPER. That is all, I think, Mr. Chairman.

The CHAIRMAN. I have a telegram here, dated December 12, 1918, addressed to me. It says:

Mr. C. B. Cooper will appear before your committee to represent us in connection with H. R. 13159. The operation of the radio service of the Navy has been of inestimable value to shipping in general, and we heartily indorse it, because it obviates the possibility of blockaded or jammed messages by coast stations belonging to different owners and those by ship stations.

That is signed "Luckback Steamship Co. (Inc.)"; but I do not know of any other steamship company with a similar name except the Luckenbach Steamship Co., and I take it that it is that company.

I understand that Mr. Cooper has just arrived in the city and that he will be here in a few minutes, and we can take a short recess until he arrives.

(Thereupon, the committee took a recess of 30 minutes, at the conclusion of which the hearing was resumed.)

The CHAIRMAN. Mr. Cooper is here. Mr. Cooper, give the committee your name and address and your business.

STATEMENT OF MR. C. B. COOPER, NEW YORK MANAGER FOR THE KILBOURNE & CLARKE MANUFACTURING CO., AND GENERAL SUPERINTENDENT OF THE SHIPOWNERS' RADIO SERVICE (INC.), 149 BROADWAY, NEW YORK.

Mr. COOPER. My name is C. B. Cooper; address, 149 Broadway, New York.

The CHAIRMAN. And what is your business?

Mr. COOPER. My business is New York manager for the Kilbourne & Clarke Manufacturing Co., and also general superintendent of the Shipowners' Radio Service (Inc.).

The CHAIRMAN. What is the business of that first company you mentioned?

Mr. COOPER. The first company's business is the manufacture of radiotelegraph apparatus. The business of the second company?

The CHAIRMAN. Yes.

Mr. COOPER. Is that of handling the service details of radio apparatus for several companies using apparatus on ships or shore stations.

The CHAIRMAN. You may proceed, Mr. Cooper.

Mr. COOPER. I have also been requested by several steamship companies to represent them, and if permitted I would like to read this telegram that I received from them. It is from Seattle, Wash.:

We, the undersigned shipowners and managers of the Puget Sound district, authorize you to represent us as favoring the passage of the Government bill,

H. R. 13159, and urgently request you to do all in your power for the accomplishment of this proposal, which we feel would greatly add to the efficiency of communication from and to all ships using radio apparatus.

R. R. PIERSON,

Superintendent of the Alaska Steamship Co.

G. E. PLUMMER,

Manager of the Puget Sound Tug Boat Co.

M. M. CALVERT,

General Manager of the San Juan Fishing & Packing Co.

I think that before I say anything further I should say I have not discussed with the people I have just mentioned anything in regard to General Government ownership, but I think I ought to say that I do not think that anything they say or I say should be taken to infer that they in any way favor Government ownership of public utilities except in this one particular instance under discussion.

In figuring on the interests of the manufacturers, the passage of this bill will probably make for fewer sales, because under naval operation there will undoubtedly be fewer stations erected, because one naval station will serve a complete district, which under commercial operation there would probably be several competing stations. Nevertheless, we consider this bill engenders the most efficient way to handle radio service. Therefore, what I want to say may be considered the opinion of the manufacturer as well as the other interests as mentioned.

Radio transmission is not a communicating method that can be considered in the same light as we do other communicating systems, because no one can start a radio signal traveling along a set pathway prescribed by franchise or private purchase rights, but every signal will travel where it will without regard to whose yard or radio station it trespasses on. Therefore, any system will interfere with others regardless of how carefully a station may be operated.

This means that if competing shore stations exist it is practically impossible to devise a law that would enforce equal rights for all station owners, or for those steamship companies who have to rely on the stations for ship communications, because if stations can not help interfering with others, then it is practically impossible to prove whether interference is accidental or intentional; and if the existence of a commercial station, as it necessarily must, depends on the earnings derived from the handling of messages, it is only logical that every station will do their utmost to force their business through regardless of interference with others.

Our present radio laws require certain ships to be equipped with radio apparatus, and such equipment is practically useless unless there are shore stations with which these ships may communicate. The reason that certain ships are compelled to carry their own wireless is not so that they can handle commercial messages but for the purpose of communication in case of accident as a means of saving lives.

Therefore, as far as ship-and-shore communication is concerned, that is practically the only thing of wireless communication that should be considered.

Inasmuch as wireless stations are bound to interfere, and inasmuch as, for the preservation of human life, the law requires certain ships to be equipped with radio telegraph, then it is not safe to leave

the connecting shore station length in the hands of competing commercial interests, because if a commercial interest depends on for their existence, as they must, tolls derived from messages, they must get their business through regardless of interference with others. Or if, in addition to tolls, they rely on rental or sale of ship-radio installations then they must give those ship installations as much preferential service as possible, also regardless of interference, and because wireless stations necessarily interfere it is practically impossible to devise a law which can compel stations to stop interfering.

This means that in order to get the maximum of service from shore stations one organization will control every shore station. If that control is left in the hands of a commercial organization they should also control the ship installations. Otherwise, the same competition that handle messages from ships will exist, because it will be from this means that they must derive a revenue.

It has been found impossible for one commercial organization to control the whole field by patent monopoly or competitive methods. And as the years go on and the art of wireless transmission develops it will be more impossible, because new methods and new systems are continually being devised and early patents are expiring.

The United States Government could not permit one company to operate all shore stations and have within the hands of that company communication to all naval vessels. Therefore, they have been compelled to erect their own stations. This has been found necessary in the past, and will be more necessary in the future. Therefore, they also enter into the field as a factor in interference. If the navy must operate shore stations, and if there are commercial radio stations, then these two organizations are, necessarily, bound to interfere in message transmission, which interference not only injures the usefulness of wireless in the life-saving field, but endangers the usefulness of the United States Navy itself. Therefore, I believe that there is only one way to obtain the maximum efficiency and good from the radio telegraph communication, and that must be that the United States Government control every station, because this means that we will have a noncompetitive, disinterested party handling the shore end of the business that will not have to rely on its existence for tolls derived from commercial messages, but an organization which will be able to put in every means of long-distance control and section of operators, proper working schedules, and every means known to make for speedy handling of business and a minimum of interference.

In the first stages of radio communication the primary object of the commercial companies was to rent a set of apparatus for use on steamships, and in order to make this leasing possible it was necessary to provide a shore station with which such sets could communicate. Steamship companies see no usefulness in radio communication, and were right in considering that it was useless without shore stations. Therefore, various companies in the United States erected land stations to accommodate their particular zone of operations, and one station or one ship of one system would not communicate with ships or stations of other systems, because the main argument to induce a steamship company to adopt one particular system of apparatus was, necessarily, the facilities that the system should produce for the transmission of messages to shore. Our first radio corrected this non-

working limitation, and forced all stations of any system to communicate with stations of another system. But still, because of the peculiar nature of wireless signals, it was practically impossible to enforce this law and not have interference.

In the meantime the United States Government had found it necessary to erect their own stations, and, in as much as they had these stations, they put in a rule that they were open to communication with any ship station. This helped the situation considerably, because it meant that if a ship could not get service from a commercial station, they would naturally be able to communicate with a naval station. This is the condition naval radio communication was in prior to the war, and it is probably the situation that it will go back to if the bill under discussion is not passed, and under this condition it is impossible for radio to produce its best and most useful service.

The spirit with which steamship companies first viewed radio communication is now changed, because with the growth of shore-station communication and because of numerous ship installations that now prevail, and the efficiency of apparatus used, they are enabled not only to safeguard their passengers and crew, but they can obtain and transmit useful information to or from their ships. This last phase is secondary to the safeguarding of life, but is nevertheless important, and therefore it is of vital importance to them that shore communication be taken out of the chaotic condition that is bound to prevail under commercial operation, and that it be put in the hands of one organization, which organization is logically the United States Navy, because they are the ones who are absolutely compelled to have their own stations for communication with naval vessels, and they are compelled, therefore, to keep up an organization for the handling of their own stations. We can, with a very little extra expense, make this organization sufficient to care for all stations and all business pertaining to radio. Actual experience has shown me and those I represent that the naval communication service is well, ably, and efficiently organized to handle this business. Therefore I respectfully urge upon you the necessity of your recommending the favorable decision as to the passage of this bill in its present form.

The CHAIRMAN. Do you represent any steamship companies on the Atlantic coast?

Mr. COOPER. I understand that a message was sent in by the Luckenbach Steamship Co. saying that I would be here to represent them, but I have not seen any copy of that message.

The CHAIRMAN. I read it into the record.

Mr. COOPER. I thank you for that.

Mr. GREENE. Mr. Chairman, I would like to ask the gentleman a question: As I understand, you say that if the Navy Department had this under control they would reduce the number of stations. Instead of having as many stations, for instance, as there are out on the coast, they would reduce the number—did I understand you correctly?

Mr. COOPER. No, sir. I did not mean that they would reduce the number. What I meant to say was that they would reduce the possibility of numerous stations being built if competing radio companies were permitted to build such stations, because one Navy station would control one whole district in which otherwise there might be several competing stations.

Mr. GREENE. Oh, yes. But the Navy already having bought out the several radio companies and anticipating buying others, they would have these stations that were built for the accommodation of commercial business. And this proposition now is to put them into commercial business. I agree that it is very profitable for the Navy proposition, but for commercial business they would be likely to reduce the opportunities for commercial business if they were to reduce the number of stations in the line of economy. They would reduce the number of stations, making fewer stations, but that would give less accommodation for the people who want to transact business. These stations are not built merely for pleasure; they were built for profit and use and development, built for the increase in trade, and would never have been built without trade. Now, according to the testimony we have here, they intend to develop trade and increase trade and make greater opportunities for development of the business. But, according to your theory, they would be likely to discontinue stations, because it would be more economical in the use?

Mr. COOPER. That is possible in this manner. I will cite an instance. At the mouth of the Columbia River there is a Navy station, and there is a commercial station located within a very few miles of each other. If one station was handling all business at the mouth of the Columbia River, I believe it could be handled much better and in larger volume than if the two stations were permitted to try and operate and jam each other, and probably in time there will be a number of others, whereas I say one station will more economically and more efficiently cover one district than if several stations were erected there, with a possibility of conflicting impulses.

Mr. GREENE. That is all right for that kind of a proposition. But, for instance, we take in the matter of ordinary business on the street here. We will say here are several stores down here. We can take and consolidate them into one store. The business will be more efficiently and more economically handled, and we ought to wipe out a number of stores and have fewer stores. It is of greater advantage—less money cost to carry on fewer stores. If that was the character of our theory, we should get on to a business of tremendous monopoly, and the parties controlling would do just as they please if they had no competition and struck out the number of stations and the number of business propositions. It seems to me your logic is not good.

Mr. COOPER. If you please, if each one of those stores had some business while the other was selling goods, would it not then be preferable to have all the business in one store?

The CHAIRMAN. That is a crackerjack.

Mr. GREENE. They do not happen to do that.

Mr. COOPER. That is a fact in wireless.

Mr. GREENE. And there has never been any evidence presented by the Navy Department that the commercial station at the mouth of the Columbia River caused interference with their Columbia River station or any other station.

Mr. EDMONDS. What ships are in the New York Steamship Co. that you represent?

Mr. COOPER. The Luckenbach Steamship Co. is the only one I represent.

Mr. EDMONDS. Before that you said you represented several ship-owners, associations, or something?

Mr. COOPER. I am superintendent of the Shipowners' Radio Service.

Mr. EDMONDS. I thought you represented several steamship companies.

Mr. COOPER. I do represent several steamship companies. If you sell station apparatus to one company owning one ship, they usually want some one to take care of repairs and furnish operators and all that.

Mr. EDMONDS. You do not really represent ship companies. You represent a service that you give a ship because that company asks you for it and pays you for it.

Mr. COOPER. That is the idea.

Mr. EDMONDS. Then, outside of that, the only line you represent is the Alaska & Puget Sound?

Mr. COOPER. Those are the only ones specifically mentioned.

Mr. EDMONDS. You have not said anything about overseas and trans-Atlantic stations, just the ship-to-shore service?

Mr. COOPER. I have not said anything about those.

Mr. EDMONDS. And that is a part of the bill.

Mr. COOPER. That is a part of the bill. To my mind, that enters into this only as it would cause interference with shipping business. To my mind, the primary object of wireless communication, the most important thing we can do is the saving of lives.

Mr. EDMONDS. The testimony that has been given here seems to indicate clearly that the trans-Atlantic business is an entirely separate field and does not interfere with the ship-to-shore business, and therefore you do not want your remarks to be construed as indorsing that section of the bill?

Mr. COOPER. Therefore I have said I do not indorse that section of the bill because it is something I am not thoroughly familiar with.

Mr. EDMONDS. You come here indorsing the bill.

Mr. COOPER. Yes, sir.

Mr. EDMONDS. That is, a portion of the bill.

Mr. COOPER. And that enters into my argument only inasmuch as it will cause interference.

Mr. GREENE. Were you sent here by the people on the Pacific coast, the Columbia River people?

Mr. COOPER. I am New York manager of the Kilbourne & Clark Manufacturing Co., and came here last spring. I was not sent here from Seattle; I am located in New York.

Mr. GREENE. You have been instructed especially to come here from Seattle?

Mr. COOPER. I have not been instructed to come here except as per telegram.

Mr. GREENE. Have you read the bill before?

Mr. COOPER. Yes, sir.

Mr. GREENE. But you were not sent here by the Seattle people to represent them?

Mr. COOPER. I have not come from Seattle to represent them, but simply from New York. I am sent here from New York by the Seattle people.

The CHAIRMAN. We will adjourn the hearings now for this afternoon until next Tuesday morning at 10 o'clock, at which time the Marconi Co. will have the first right to present their case, and following the hearing on behalf of the Marconi Co., other interests who care to be heard on the bill will be given an opportunity. I presume that the Marconi people will hardly finish up on Tuesday, but we will try to finish the hearings next week. However, we will give everybody ample time to be heard. Nobody has any right to be heard on Tuesday except the Marconi people, and I notified the attorney for the Marconi people that I would start the hearings on next Tuesday and that they should have the right of way.

Mr. GREENE. I do not know anything about that.

The CHAIRMAN. Others may be reached on Tuesday, because I do not know how full the hearings are going to be, but we are going to continue the hearings until completed. I have been very careful not to create any confusion or misunderstanding on that score.

(Thereupon, at 5 o'clock p. m., the committee stood adjourned to meet Tuesday, December 17, 1918, at 10 o'clock a. m.)



Y4. M53: R11/2/pt.2

GOVERNMENT CONTROL OF RADIO COMMUNICATION

HEARINGS

BEFORE

THE COMMITTEE ON THE MERCHANT MARINE AND FISHERIES

HOUSE OF REPRESENTATIVES,

SIXTY-FIFTH CONGRESS

THIRD SESSION

ON

H. R. 13159

A BILL TO FURTHER REGULATE RADIO COMMUNICATION

PART II

DECEMBER 17 AND 18, 1918



WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

COMMITTEE ON THE MERCHANT MARINE AND FISHERIES.

HOUSE OF REPRESENTATIVES.

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GOVERNMENT CONTROL OF RADIO COMMUNICATION.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
Tuesday, December 17, 1918.

The committee met at 10 o'clock a. m., Hon. Joshua W. Alexander (chairman) presiding.

The CHAIRMAN. Gentlemen, when we recessed last it was understood that the representatives of the Marconi people would be heard this morning, and I am advised by the local representative of the company that Mr. Edward J. Nally wishes to be heard first.

STATEMENT OF MR. EDWARD J. NALLY, VICE-PRESIDENT AND GENERAL MANAGER MARCONI WIRELESS TELEGRAPH & TELEPHONE CO., AND PRESIDENT PAN-AMERICAN WIRELESS TELEGRAPH & TELEPHONE CO.

The CHAIRMAN. Mr. Nally, will you give your name and your official position.

Mr. NALLY. Edward J. Nally, vice president and general manager of the Marconi Wireless Telegraph & Telephone Co., and president of the Pan-American Wireless Telegraph & Telephone Co.

The CHAIRMAN. What company is that and where does it operate?

Mr. NALLY. The Pan-American company is a new company organized to operate in South America.

The CHAIRMAN. When was it organized?

Mr. NALLY. It was organized about a year ago.

The CHAIRMAN. With what capital?

Mr. NALLY. With a capital of no par value.

The CHAIRMAN. Has it the same officers and stockholders as the Marconi company?

Mr. NALLY. Not altogether. The Marconi Co. of America owns three-eighths, the Marconi Co. of England three-eighths, and the Federal Telegraph Co. of California two-eighths.

The CHAIRMAN. The Marconi Co. of America is the one of which you are the vice president?

Mr. NALLY. Yes, sir.

The CHAIRMAN. What interest has the English company in that company?

Mr. NALLY. They hold a stock interest; a minority stock interest.

The CHAIRMAN. How is the stock interest divided?

Mr. NALLY. You mean exactly?

The CHAIRMAN. Yes; that is, how many shares are owned and controlled by them?

Mr. NALLY. As near as I know, they own less than one-fourth of the entire stock of \$10,000,000.

The CHAIRMAN. Do any other foreign companies or persons own stock in the American Marconi Co.?

Mr. NALLY. There are, of course, foreign stockholders, but no foreign companies.

The CHAIRMAN. That is all, Mr. Nally. You may proceed.

Mr. NALLY. In the press dispatches of November 25 there appeared a statement given out by the honorable chairman of this committee, in which he incorporated a statement prepared by officials of the Navy Department giving their reasons why the Government regards it necessary for the Navy to own and operate radio stations in this country. Among other things, it stated:

The part played by high-power stations in this war and before the United States became a party to it shows very clearly the necessity for governmental operation of these stations. Transoceanic radiotelegraphy is not a serious competitor of the cables.

By referring to the evidence just introduced by the Navy Department before this committee and quoting from Secretary Daniels down to Lieut. Cooper one would get a very different impression of the part played by high-power wireless stations, and certainly the comparison of high-power service with cable service, instead of showing that transoceanic radiotelegraphy (to quote the statement) "is not a serious competitor of the cables," the evidence of the Navy officials would strongly prove the contrary to be the case.

The Navy statement further reads:

High-power stations are not yet able to receive from one another all day in all seasons.

Yet, Commander Hooper, in his very interesting report of what the Navy had accomplished with its high-power service, says:

I am not making any new prophecy when I state that the competition [between high-power wireless and submarine cables] will be very keen. Since the war has been on we have established reliable communication across the ocean, and now we never miss a message from the other side; that is a fact.

Why this effort, on one hand, to extol the value and advantage of wireless, and, on the other, while depreciating its worth wishing to hold onto it? Is it because, as Wilde says, "All men kill the things they love"?

Further, I read:

Cable communication is secret, while signals from radio stations are transmitted equally in all directions, and all nations can read the business of all others.

It had always been acknowledged that cable communication possesses the virtue of secrecy, but I was startled some months ago by a report coming from a representative of the Navy Department that there were reasons for the belief that submarine cable communication would be no longer secret and it was feared that the enemy was copying all of the intelligence which passed between the United States and our allies.

This was supposed to have been accomplished by laying a short length of submarine cable parallel to and alongside of the existing cable and continuing the short length into Germany, where signals induced in the short length of cable were easily read by means of recorders and magnifiers.

This is an old trick, often played on land, but the report was not credited by practical cable engineers; nevertheless it was an interesting possibility, and inasmuch as it was sponsored by representa-

tives of the Navy Department there is no reason why they should not be expected to support the statement in contradiction of their present statement that submarine cable communication is secret.

It is quite true that "signals from radio stations are transmitted equally in all directions," but it is not true that "all nations can read the business of all others." That one individual may not learn the business of another and that one nation may not know the private correspondence of another is the prime reason for the use of codes and ciphers.

Inasmuch as governments regard private codes of the highest value, and inasmuch as private commercial concerns also do, we must assume that they fulfill the purpose for which they were designed, namely, perfect secrecy for written communication.

There is no reason why the most obtuse code or cipher can not be transmitted by radio with an equal degree of accuracy and secrecy as by the so-called secret submarine cable. We also know that this objection has no foundation in fact, for the reason that the Government itself has been sending, by means of its high-power stations situated on the Atlantic seaboard, long and important secret cipher communications to its representatives in Europe during the last 12 months, and if there was any possibility of all nations learning the confidential affairs of this Government such messages would not have been sent by radio when submarine cables were available.

Even though it be taken for granted that submarine cables offer a more secret medium of communication, that fact has never been of weight with the large interests that have made use of the submarine cables in their business intercourse. Secrecy was to them essential, and the only security they had faith in was that offered by a first-class code or cipher; and it is a fact which can easily be proven that prior to the introduction of cheap, plain-language cable messages over 99 per cent of the total communications crossing the Atlantic were in code or cipher. A plain-language business cable message, apart from press matter, was a great rarity.

It were rash to claim that wireless could completely supplant the cables, but it is equally misleading to say that wireless telegraphy is not a serious competitor of the cables. Both forms of communication have their distinct and separate value, and some of the reasons urged against radio telegraphy will not bear analysis.

Lack of secrecy is claimed as the one great weakness of radio and its only disadvantage. In these days of peace conclaves and of centering of hopes upon a great league of nations and the establishment of genuine and lasting brotherhood among nations, the most potent of all means for establishing broad understanding and creating harmony and sympathy is the vital one of communication. The greater our means of international communication, the closer we will get in touch with the peoples of other nations.

It is quite conceivable that with the growth of closer international relations and the larger community of interest which will express itself in the proposed league of nations, and in view of the fact that wireless signals radiate in all directions, a high-power "world-wide" wireless station located, say, in the neighborhood of New York, to broadcast and disseminate daily for the benefit of our Government or for newspaper associations a digest or résumé of the news of North America, would be an invaluable instrument in our President's scheme

for greater harmony and intercourse between the countries of the world.

Such a situation is a very likely one, in view of the prominent part in world affairs assumed by the United States. One such station, and one such transmission, would circulate matter simultaneously to Mexico; West Indies; Central America, and all the South American countries; great Britain; all of the European countries, and perhaps even to South Africa, and the Far East. Such news matter, of course, would necessarily be in plain language, for the world to read.

To duplicate this effort by submarine cables at the present time is an impossibility; to connect the world so directly with the United States, as is here suggested, would involve an expenditure, for submarine cables alone, of more than a hundred million of dollars, and in addition to the economical saving that would be effected by wireless, the economy of time and of effort in transmission of such information by wireless as compared with cable is too obvious to need further explanation.

So that here it is possible, without any great stretch of imagination, to turn this so-called defect of radio into one of its greatest advantages.

In the testimony of Lieut. Cooper an attempt is distinctly made to imply that sensational progress in this branch of the art has been made during the past 18 months, or since the United States declared war and took possession of all United States radio stations on April 7, 1917, and that the remarkable progress made should be properly credited to the United States Navy Radio Service.

This inference is entirely misleading. The most important advances related by Lieut. Cooper are:

First, that the Navy Department has developed a wonderful system of distant control, whereby it is now possible to concentrate in one small office in Washington the operating keys, which energize high-power transmitting stations situated at various points on the Atlantic coast. The connection, of course, is made by land lines leased from the telegraph or telephone companies.

Second, duplex operation is now said to be entirely successful as operated by the Navy Department, by means of which messages can be sent to Europe at the same time that messages are being transmitted by stations in Europe to the United States.

Third, the design of a special antenna which produces a so-called "egg-shaped" wave, or a wave so distended in the direction in which it is desired to communicate that the maximum effect is produced in that direction with the minimum interference in other directions.

In order that the committee might appreciate the correct facts in the development of distant control and duplex operation, and of which apparently some naval officers are not even aware, it is only necessary to mention that transoceanic communication was first established by the Marconi Co. between Ireland and Nova Scotia, in 1907, or 11 years ago. The service rendered at that time was limited in character and was utilized mainly by newspapers. The service, however, was so successful that it was opened the following year, 1908, or 10 years ago, to general public correspondence in competition *with the existing submarine cable facilities*, and many hundreds of *thousands of commercial messages* were transmitted between Great

Britain and Canada, or the United States, without serious interruption, until 1917, when the stations were utilized exclusively for governmental purposes. In passing, I might mention that this same trans-Atlantic service has been released by the British and Canadian naval authorities since the armistice was signed, and is again open to commercial intercourse in competition with the submarine cables.

This was the first and most important long-distance-wireless commercial circuit, and the experience gained in the operation of this pioneer circuit has been of inestimable value to the art in the development and progress of later and higher-powered transoceanic wireless circuits. During all this time, when the obstacles appeared almost unsurmountable and when the financial success of such service was seriously doubted by most people, there was no particular interest in international radio communication shown by our Navy Department. It is true that the Navy Department, within the last five years, has built a number of high-power stations, the object of which was to communicate in emergency with our naval outposts, such as Hawaii, Guam, and the Panama Canal; but the first noticeable desire of the Navy Department, to engage in commercial international communication, was discernable shortly after circumstances, with which the committee is thoroughly familiar, placed the operation of the Sayville and Tuckerton high-power stations in the hands of the Navy Department. They immediately realized the full possibilities of an international high-power radio circuit, and we have it on record, in the minutes of the previous hearing, that the operation of these stations was so profitable that within a period of two years, and after deducting all naval operating charges, a return of over 30 per cent has been earned upon the investment. This high return, however, was not so much due to the efficient operation of the stations, as claimed by the Navy Department, as to the exorbitant tolls which were charged on the traffic handled. Prior to the severance of the submarine cables connecting the United States with Germany, the tariffs were 25 cents and 12½ cents per word, but during the time that the radio stations were operated by the Navy Department, this tariff was set at 50 cents per word.

As Secretary Daniels openly informed us, a few days ago, it would be "good business" for the Navy Department to take over the operation of all high-power radio stations, but it should not be forgotten that this "good business" was foreseen in 1908 by the Marconi Co., and ever since that time we have been striving to improve our high-power machinery, so that we might have an opportunity to fully enjoy the fruits of our labors, and also to earn for our 22,000 stockholders some suitable return on the investment of the many millions which we have placed into high-power stations waiting at this moment to furnish a commercial international high-power service to Great Britain and Ireland, to Scandinavia and Russia, and to Hawaii, Japan, and the Far East.

Now, reverting to the claims here made that specific improvements, such as distant control and duplex operation, are the results of naval efforts, developed during the stress of war, I desire to state, and radio engineers the world over will corroborate my statement, that the Marconi Co. was the originator of the schemes of duplex operation and distant control. In the year 1912 the original trans-Atlantic service having become congested with traffic, it became necessary to in-

crease its carrying capacity, and Marconi engineers planned the method by which the capacity of that circuit was doubled by the use of duplex operation: and, since that date—I repeat, this was six years ago—the trans-Atlantic service spoken of, has been continuously worked duplex. At the same date, Marconi engineers arranged for the operating key to be placed some 50 miles away from the transmitting machinery, and this has since that time been the sole manner in which all Marconi high-power stations have been operated. This, gentlemen, is the same distant control of which you have heard Lieut. Cooper speak in connection with his concentrated telegraph office in the Navy Department Building.

The American Marconi high-power stations, which were completed on the Atlantic coast in 1914, were designated for exclusive duplex operation and are so arranged to-day. The American Marconi trans-Pacific high-power stations, which have seen commercial operation since September 24, 1914, were designed for duplex operation and were operated by this same system of duplex control. For confirmation of this fact Lieut. Cooper need only ask several of his ex-Marconi operators now working for him in the Navy Department building, and who formerly operated in a highly efficient manner the Marconi trans-Pacific high-power service to Hawaii and Japan.

We are particularly gratified to learn of the Navy Department's success with the egg-shaped wave, and it will surely interest Mr. Marconi, who invented and patented the well-known Marconi directional aerial many years ago, the effect of which is to project a wave more effective in the direction of the receiving station than in any other direction. All Marconi high-power stations in this country were equipped with this "egg-shaped wave" producing antenna in 1913 and 1914.

Lieut. Cooper further stated that "since the war the Navy Department has had more experience in handling high-power radio traffic and is therefore in a better position, from a practical operating basis, to say what can and what could be done than anybody else."

We have no desire to belittle the splendid work of Lieut. Cooper or of any other naval officer, but he himself confessed to being an amateur in radio work and a lawyer by profession, and it is only fair to the Marconi Co. to point out that the radio-traffic expert who was singled out by the Navy to directly supervise the operators employed in this central radio station in Washington, where such alleged wonders have been worked, was, up to the date of our entering the war, in direct charge of the Marconi high-power trans-Pacific circuit. He has devoted his career to the problems of radio communication and patriotically offered his services to the Navy Department when they were in need of highly qualified men.

The CHAIRMAN. Did you name who that was?

Mr. NALLY. Mr. Baxter.

We do not claim to have a monopoly on operating talent, but the fact stands out strongly that the Navy Department, in April, 1917, when this country entered the war, was short of really competent, high-grade transoceanic operators and appealed to this company for such men as we had specially selected and specially trained for this important branch of radio. It should be realized that there is a vast difference in the efficient operation of a ship-to-shore service and the requirements of a high-powered international service. This latter

work is most exacting, and perhaps not more than a few out of a possible hundred average wireless operators have the requisite ability to satisfactorily cope with the heavy and high-speed work encountered on a transoceanic wireless circuit. I have already said that this company had picked a group of specialists, and it was these men the Navy Department made special call for to assist in the new high-power responsibilities when this country entered the war. With one or two exceptions, the whole of this force volunteered its services to the Navy Department, and they are to-day to be found occupying responsible positions both in the high-power stations being operated by the Navy Department and also in the central radio office, with which Lieut. Cooper himself is connected.

I might also say that the Marconi Co. has successfully operated transoceanic radio service at a higher rate of speed than has ever been accomplished by other agencies. The Marconi Co. was the pioneer in automatic high-speed transmission and automatic high-speed reception. It has developed this system to a remarkable degree of proficiency. Whereas it is not possible to operate a radio circuit by hand (or, as we term it, manual operation) at more than 30 words per minute, the Marconi Co. has successfully and for long periods transmitted by automatic-speed operation at speeds varying from 60 to 100 words per minute. This remarkable advance in the art, as can readily be seen, immediately doubles and even quadruples the capacity of a single circuit. I believe I am safe in saying that the Navy Department still makes use of the old system of manual transmission in the operation of its high-power stations.

The Navy Department, while making every effort to obtain a monopoly of wireless, would have it appear that this form of communication is something wholly different from other forms of electrical communication. In Postmaster General Burleson's letter of January 5, 1917, to the honorable chairman of this committee he writes:

There is no essential difference in principle between communication by radio and communication by telegraph or telephone. The fundamental principle involved in all means of electric communication is the transmission of intelligence.

I am in full accord with Mr. Burleson's views on this point. Prior to October 1, 1913, when I joined the Marconi service—and I was the first telegraph man to enter wireless—I had been continuously in the telegraph business for more than 38 years, starting as a messenger boy with the Western Union in 1875 and resigning from the Postal Telegraph-Cable Co. in 1913, where I was a director, first vice president, and general manager.

The period from 1875 to the present date made me a pioneer in all the forms of communication by electricity. I was associated in the construction and operation of most of the transcontinental telegraph routes. I have visited nearly every town and hamlet in the United States. I am familiar with every part of the telegraph service, and I can truthfully say that I experienced no appreciable change when I transferred from the land lines and cables to wireless, except, to speak in paradox, that whereas in the land-line service I was ever thinking of schemes to educate the public how to use the wire more, in radio, my new field, I argue why the public should use the wireless.

What Secretary Daniels stated in his opening remarks on Thursday of last week about the early history of wireless is unfortunately true. Wireless was such a wonder maker that it appealed readily to the imagination, it was a word to conjure with, and it was natural that men who lived by their wits and saw an opportunity to make money out of a trusting public should seize upon it as a means to that end. But all of this is past history.

The year 1912 found the Marconi Wireless Telegraph Co. of America in full possession of all property formerly belonging to the defunct and dishonest United Wireless Corporation, and the Marconi Co. undertook to construct a substantial and highly efficient organization to serve the public, and I can truthfully say that it has succeeded in doing so. The corporation to-day is as clean as a hound's tooth, it is vigorous and virile, and it has made surprising strides in the last few years and in the face of a most difficult and, at times, most discouraging conditions and under circumstances that would ordinarily have caused failure to a less vigorous organization.

I very much appreciate, personally and officially, the tribute which Commander Hooper made to myself and to the Marconi Co. in his talk to the committee on Friday, and when you hear the brief report which I ask your permission to make, touching upon the activities of the company during the period of the war and for a short time prior thereto, I feel sure you will be convinced that the credit which the Navy Department so generously gives the company has been fully earned.

When, in August, 1914, the European war broke out the American Marconi Co. was at work upon the final tests of the high-power stations which it had constructed at great cost at New Brunswick and Belmar, N. J., for operation with similar and complementary stations owned by the British Marconi Co. and located in Carnaven and Towyn, Great Britain.

Immediately upon the declaration of war Great Britain took over the high-power stations at the places named, and we were, therefore, unable to carry on our great enterprise.

Many months in advance of the time that we had appointed for the opening of our service we engaged a corps of the finest and most expert operators that ever worked a cable—we had our pick from the different cable companies. These men were given a course of many months' training in wireless, and finally, when on September 24, 1914, we completed our chain of high-power stations in California and Hawaii for trans-Pacific communication with Japan, via Hawaii, we utilized many of these men for this service, which was in very satisfactory operation at the time our country entered the war in April, 1917, when our Government took over all of our stations, both coastal and high power, and have had them ever since.

We also erected in Massachusetts a transmitting station at Marion and a receiving station at Chatham, Cape Cod, high-power stations similar to the New Jersey, California, and Hawaii stations above referred to, but the completion of these stations was delayed and interfered with on account of the war, the Norwegian stations, with which they were to work, having only recently been completed. This circuit was intended for wireless communication with Scandinavia and Russia, and but for the war would be in full operation at this time.

The company also constructed and operated coastal stations for ship and shore business at 45 points, from northern Alaska, on the Pacific coast, to southern California, and from the extreme North Atlantic coast to the extreme South and in the Gulf region and in the region of the Great Lakes.

The company also established schools of instruction in the larger cities on both coasts and on the Great Lakes, and the graduates of these schools, numbering many thousands, form by far the largest source of supply in this country from which trained wireless operators were drawn.

Through cooperation with colleges and Young Men's Christian Associations the company is doing everything it can to increase the interest in the study of wireless, with the idea of developing the art in every way, and in this respect it has been very successful.

The company also publishes, through its subsidiary, The Wireless Press, a monthly magazine called "The Wireless Age," which is the only American publication of the kind devoted entirely to wireless, and which ranks with the best technical magazines in the country. In addition to this publication the company also publishes and distributes the Ocean Wireless News on passenger ships carrying Marconi apparatus.

Wireless textbooks, written by the Marconi Co.'s staff of engineers and experts, are to be found in every school and in the homes of nearly every wireless student in the country. More than a hundred thousand copies of these textbooks, the standard in their radio schools, and they used them by the thousand.

Just before the war broke out the company operated a factory at Aldene, N. J., and gave employment to about 125 men. This factory covered a floor space of only 20,000 feet. To meet the demands of the Government several new additions were made, and the works now covers a space of 80,000 square feet and employs over 800 men and women. For a time it ran continuously, with three shifts. Nearly all of its facilities were used in manufacturing apparatus for the Navy, although some very substantial orders were received and important work was done for the Army. This factory designed and developed for the Government for use in the war more than 3,000 wireless telegraph and wireless transmitting and receiving sets.

Secretary Daniels, in his arguments before this committee on Thursday, made the following statement in answer to Mr. White's question:

MR. WHITE. In order to make this governmental program efficacious, will it not be necessary also to have an international arrangement? Otherwise you might have a Mexican wireless, and a Canadian wireless, and a European wireless interfering in just the way you seek to prevent it: is not that true?

SECRETARY DANIELS. If there are no newspaper men in the room I would like to answer that. I am one myself, but I would not like them to print it. I hope they will not print this. But in recent months during the war certain nations, through corporations not known to belong to other governments, have sought concessions from South American republics to put in high-power stations to connect with high-power stations which they owned in America. I think it would be a crime for us in America at this time not to protest and not to go on record that we are going to own all this wireless in America and that no country under the sun can put a high-power station in America unless it is a foreign government which we understand and which we can control. There are companies now that own high-power stations in America who are seeking concessions in South American countries not owned by a private company but

chiefly owned by foreign governments which wish to get control of the wireless all over this hemisphere, and we ought not to permit it.

Mr. WHITE. It would require an international arrangement to prevent a Canadian company or a Mexican company interfering with anything we might do under this bill?

Secretary DANIELS. Yes.

Mr. WHITE. The international operation of wireless is controlled by international and political reasons?

Secretary DANIELS. International reasons and physical reasons, also.

I think he must have had in mind the Pan American Wireless Telegraph & Telephone Co., of which I am the president, and in view of the fact that the Government, particularly the State and Navy Departments, were consulted before this company was organized and its charter was viséed, corrected, and amended by the solicitors of both departments, Mr. Daniels's remarks, I think, call for some comment.

In October, 1915, I addressed the honorable the Secretary of State in regard to wireless communication with South America. I explained to him the program which the American Marconi Co. had in mind to follow in conjunction with its connecting company, the British Marconi Co. I fully explained the organization of the American company, but the Secretary of State replied that while recognizing the American corporate character of the Marconi Wireless Telegraph Co. of America, the State Department was obliged to inform me that it was inclined to lend its support abroad to the efforts of undivided American interests rather than to those who were affiliated with foreign corporations.

I replied fully on November 4, 1915, that the American company had under consideration plans for the extension of its operations to South America and the erection of high-power wireless stations on both the east and west coasts of that continent, provided the requisite concessions for that purpose could be obtained, and that while we fully appreciated the position taken by the State Department as outlined in the reply above set forth, the American company had determined to proceed along lines wholly independent of any other company in its endeavor to obtain the requisite concessions, and asking for the support of the State Department.

Later an official of the Navy Department suggested the advisability of the organization of an entirely separate company to exploit long-distance wireless communication with South America, and, with the consent of our Government and of the State and Navy Departments aforesaid, this organization was consummated.

On February 6, 1918, at the request of two officers of the Navy, I addressed the accompanying letters to the Bureau of Steam Engineering, which, with your permission, I will read into the proceedings of this committee:

PAN AMERICAN WIRELESS TELEGRAPH & TELEPHONE CO.,

New York, February 6, 1918.

BUREAU OF STEAM ENGINEERING,

Navy Department, Washington, D. C.

GENTLEMEN: Confirming my promise made orally to Commander Le Clair and Commander Sweet when in Washington last week, I herewith submit, for your information and for such favorable action as you may decide upon, this company's plan for long-distance wireless expansion in South America. Desiring to work at all times in the closest possible harmony with the wishes and aims of the Government, and realizing that the erection of high-power wireless stations in all the countries of Latin America will not only be of the highest importance as regards benefits conferred, but will also at this time involve ques-

tions of considerable delicacy, especially to the Navy, I respectfully request that you will let me know, as definitely as circumstances may admit, the measure of the approval which we can expect from you for our program and, as well, any points for criticism which you may find in it.

OBJECT.

The Pan American Wireless Telegraph & Telephone Co. has for its main purpose the closer linking together of the Americas by means of radio telegraphy and telephony. Primarily its activities will be directed to the rendering of a first-class wireless telegraph service between the United States and South America, to be followed later with extensions to the smaller territories of Central America, Mexico, and the West Indies.

The general idea of an "all-American" commercial wireless service between the South American countries and the United States has been discussed regularly at Pan American and scientific conferences for several years past. The need for such additional means of communication has long been apparent. Brazil and Uruguay have always been totally isolated from the United States telegraphically, except by means of British-owned cables, which first cross the Atlantic before connecting with other cables to the United States. The telegraph rates from this country have, in consequence been excessively high, and to-day the tariff from the United States to Brazil is considerably higher than that to Argentina.

PROGRAM.

As you are fully aware, we have already completed arrangements for the entrance of our company into Argentina, and expect to erect a station in Buenos Aires, which will work direct with New York.

Our next field will be Brazil, Paraguay, and Uruguay, and it is our desire to proceed without delay in an effort to secure the consent of the Governments of these countries to permit us to unite their principal cities into a system which, like that of Argentina, will be of such power that a continuous and direct commercial service may be had with the United States. In this zone the plan is to erect the high-power station near Rio de Janeiro and medium powered intercommunicating stations at Para, Pernambuco, Bahia, and perhaps Santos.

Following this our next effort will be made in Chile and Peru, where it is desired to erect intercommunicating stations at Valparaiso, Antofagasta, Lima, and Iquique. The Lima station will be of sufficient power to work direct with the United States and to be a central collecting and distributing station for all the west coast countries.

Continuing northward, it is desired to erect stations at Buena Ventura, in Colombia; at Caracas, in Venezuela; at Limon, in Costa Rica; at Guatemala City, in Guatemala; at San Salvador, in Salvador; at Managua, in Nicaragua; as well as station at Tegucigalpa, in Honduras.

In the West Indies we contemplate the erection of a high-power station near Habana, Cuba, and additional stations in Porto Rico, Santo Domingo, and the Virgin Islands.

It is also our wish, if possible, to include Mexico in our program, if such activity at present is not considered untimely. In Mexico the preliminary work will not be easy, and we expect to encounter delays and obstacles which may require months of negotiations to overcome. Here we have to contend with not only a weak, half organized government, but we also find there our German wireless competitors already entrenched with a number of stations, and this, added to the fact that the new Mexican constitution is only just beginning to be interpreted, causes us to look forward to tedious delays in our negotiations. For these reasons we feel we should begin our work in Mexico as early as possible, so that the necessary concessions may be secured for commencing active operation as soon as the European war terminates.

GOVERNMENT SUPPORT.

In all this important work of linking together the sister Republics with the United States by means of an all-American wireless telegraph company, it is most essential that we have the whole-hearted support and cooperation of the State and Navy Departments, and it is specifically for this purpose that we are addressing you to-day.

Not only from the point of view of this company, but also from the larger view of the whole country, whose business interests we will serve in a most important way, the carrying out of our program should not be delayed a moment longer than necessary, for, as is agreed by everyone, the United States must be ready in every sense of the word if it is to be successful in retaining its rapidly increasing share of South American trade when the war is over. And in all the propaganda which we propose in winning our way into each of these countries we will always be paralleling the Government effort to create and foster a greater friendliness for all things American.

In those countries where German intrigue has obtained a foothold the Telefunken stations have been doing their part, and it must be considered a decided gain to all of us whenever the Pan American Wireless Telegraph & Telephone Co. is able to persuade the Government concerned to supplant such stations with those which will be "made in America" and operated under American management.

Very respectfully,

EDWARD J. NALLY, *President.*

FEBRUARY 27, 1918.

Commander G. C. SWEET,
Navy Department, Washington, D. C.

DEAR COMMANDER SWEET: I hand you herewith a copy of my letter of February 6, in which I outlined for the Pan American Wireless Telegraph & Telephone Co. its plans and program for South American extension of long-distance wireless, and I particularly call your attention to the paragraph on the second page in which I refer to Mexico. I speak of this because of our conversation this morning in which you requested that I make clear just what we have in mind with respect to Mexico. I have a good man available; in fact, he is waiting for instructions to proceed to Mexico City and carry on negotiations along the lines outlined by me.

I hope that I may receive approval soon from the State Department, who, I understand, have my letter before them, to proceed with the Mexican matter.

Yours, very truly,

EDWARD J. NALLY, *President.*

FEBRUARY 27, 1918.

The SECRETARY OF THE NAVY,
Washington, D. C.

SIR: At the suggestion of Commander Sweet and on behalf of the Pan American Wireless Telegraph & Telephone Co., an American enterprise, of which I am president, I wish to state that there is no British or other foreign representation on the board of the Pan American Co. nor among its officers. Its charter, with which you are familiar and which was submitted to you before completion of its organization, provides that there shall be no alien control. At present the stock holdings are divided as follows:

Marconi Wireless Telegraph Co., of America, three-eighths; Federal Telegraph Co., of California, two-eighths; Marconi Wireless Telegraph Co. (Ltd.), of England, three-eighths, so that you see the American interests are five-eighths against the three-eighths held by the British company, and the latter's stock is nonvoting.

MR. WHITE (interposing). May I interrupt you at that point? You say "the latter stock is nonvoting?"

MR. NALLY. Yes, sir.

MR. WHITE. That is, the Marconi, of England?

MR. NALLY. Yes, sir.

MR. GOODWIN. While the interruption is on, will you permit me to ask you a question? Will there be any opposition in South America to the establishment of American wireless in that country, controlled by Americans?

MR. NALLY. Only by our Government.

MR. GOODWIN. Only by our Government?

MR. NALLY. I say, only opposition by our Government, and not by the South American Governments.

Mr. HUMPHREYS. Will you pardon me, but I do not understand that exactly. Do you mean that the only opposition to Americans owning and operating wireless stations in South America comes from our Government?

Mr. NALLY. Yes, sir.

Mr. GOODWIN. And none from the South American Governments?

Mr. NALLY. No, sir.

Mr. HUMPHREYS. Do you mean by that that our Government is opposed to it because they want to do it themselves?

Mr. NALLY. Yes. If you will permit me to finish, I think I will explain that fully.

The British company received its stock interest in the new company in return for patents, concessions, and other valuable interests owned by them in South America which was their contribution to the new company. The Federal Co. received its two-eighths and the American Marconi Co. its three-eighths in return for their respective contributions to the new company.

I am very anxious to push the work in connection with the construction of high-power stations in this country and in Buenos Aires with the least possible delay, and it is particularly important that work should be commenced in Argentine because the concession granted to our company there will expire on June 27 next, unless land for a site is acquired and actual work on the new station begins.

Hoping to hear from you very soon that the above is satisfactory and that the proposed plan as outlined in detail in my letter of February 6 meets with your approval, I am,

Very respectfully.

PAN AMERICAN WIRELESS TELEGRAPH & TELEPHONE CO.,
By EDWARD J. NALLY, *President*.

MARCH 4, 1918.

The SECRETARY OF THE NAVY,
Washington, D. C.

SIR: Supplemental to my letter of February 6, addressed to the Bureau of Steam Engineering, and my letter to you dated February 27, I beg to state that it is our wish to begin immediately the work of securing concessions and sites in Central and South American countries for the high-power wireless stations which we propose to build, and which will constitute a chain of high-power stations connecting South American countries with North America. I hope that the plan as outlined with much detail in previous letters meets with your approval.

I wish to say further that the Pan American Wireless Telegraph & Telephone Co. pledges itself to employ American citizens only as officers, engineers, and operators, both as comprising its staff and its operating force, at all high-power stations to be erected by this company in the United States for communication with South American countries. We will be willing that such officers, engineers, and operators shall be employed with the understanding that they shall be enrolled in the United States Naval Reserve Force under conditions and regulations to be proposed by you.

While the scheme of my company is one of great magnitude and importance and was conceived with the idea that it will prove to be a success from a business standpoint, and one which will bring those who take financial part and responsibility in it reasonable returns, we also think that it will be a very helpful and potent thing for the Government and will constitute a strong arm in the event of war or times of stress.

Of course, we can not hope to obtain money—and we shall require very large sums for such a vast enterprise—unless we give reasonable assurances to those who invest that the business will not be interfered with nor interrupted so long as it is conducted along legitimate lines and in harmony with the Government, but I think I can speak for our stockholders and say that should the present policy of the Government with respect to the ownership of high-power wireless stations be changed and legislation enacted placing the ownership of such stations in the Government, in such event the company will be satisfied with remuneration and compensation based upon its investments and its obligations taking

into account the company's physical assets, its good will as a going concern, the value of the circuit or circuits from a traffic-bearing standpoint, and just consideration and allowance for the fact that the taking over by the Government of the United States high-power stations would greatly affect, if not wholly destroy its investment in and the business of its foreign stations.

Very respectfully,

EDWARD J. NALLY, *President*.

I was assured by Commander Sweet that the matter was now clear to Secretary Daniels, and that there was no obstacle in the way of our plans, and accordingly, on April 17, I sailed for South America, proceeding directly to Buenos Aires, Argentina, where I arranged for the extension of the concession which had been previously granted to a subsidiary of the Federal Telegraph Co., known as the Federal Holdings Co., which we had purchased, and which concession was about to expire.

In addition to the extension, I had the concession greatly broadened, and I arranged for a site near Buenos Aires for the transmitting station, a public spirited citizen of Argentina, the honorable Dr. Benito Villanueva, who has been respectively Senator, Vice President, and Acting President of Argentina, donating the larger portion of the land required for this purpose.

I also visited Peru, Chile, Uruguay, and Brazil, and everywhere I found the people and the government officials whom I saw most favorable, indeed, enthusiastic over our proposition, and all expressed themselves as anxious to cooperate and assist in every way. But, owing to the war, and the difficulty of obtaining material, and the general uncertainty in regard to the shipment of apparatus, I thought it wise not to ask, at the time, for concessions in other countries than in Argentina.

Upon my return from Argentina I was informed that our Government had undergone a change of heart; that the Pan American Wireless program was in disfavor and I called upon the Navy officials, some of whom reassured me; others stated that the Secretary of the Navy was absolutely committed to Government ownership.

I called on Secretary Daniels, who was very outspoken in the matter, and who confirmed what I had heard. He positively stated he would not favor the erection of wireless stations by the Pan American Wireless Telegraph & Telephone Co., and, in fact, disclaimed all knowledge of his department having passed on the proposition and having approved it, stating that he did not do so personally, and saying, practically, what he repeated in his remarks before this committee.

I attempted to argue with him that a private company could handle the international situation much better than the Government; that I knew this was true with respect to certain countries in South America, mentioning Argentina, Chile, and Mexico, and he agreed that perhaps it was true with respect to those particular countries and that he would be glad if the Pan American Co. would go ahead with its station in Argentina and he would agree to reimburse us for all of our expenditure there when the station was completed. This, I told him, we could not do unless we were assured we could also erect the United States station, but he would not give me any assurance as to this, but stated that he would discuss the matter with the Secretary of State and advise me; but I have not heard from him since in regard to the matter. Mr. Daniels stated in the interview that he thought the objections of some foreign countries, particularly

in South America, to Government ownership would be overcome if it were made known to them that our country would be willing to finance the construction of the stations, and even furnish a trained staff to operate them, which, I inferred from what he said, would be done. I pointed out the danger of international complications in such a scheme, and told him I thought a private company could do the thing much better and with less danger.

Later, I was informed by Capt. Todd that it was the intention of the Navy Department to construct a very large station in North Carolina, near Raleigh, which would be used during the period of the war for transoceanic wireless service with the continent of Europe, probably to work in conjunction with the big wireless station which was being constructed by the United States Government near Bordeaux, France, but that the North Carolina station would be used after the war for South American service, and he hoped the Pan American Co. would go ahead with its Argentina station, which, of course, I told him we were not disposed to do.

Thus the matter rests. In the meantime we are prevented from going ahead with the necessary work at Argentina to enable us to comply with the requirements of that Government's concession, and we have stopped all work on contracts for apparatus, and likewise called in our representatives whom we had sent to other Central and South American countries.

Some facts bearing on the wireless situation in our neighboring Republic may be of interest to this committee. It shows how terribly disadvantageously we are placed with respect to the commercial wireless agencies of other countries, and the great handicap suffered by United States manufacturers and operators of wireless apparatus.

We sent an agent to Mexico to look over the situation in that country and to make preliminary arrangements toward the creation of a commercial wireless service with the United States. We were aware, of course, that the Germans were in full control of the wireless stations in Mexico, and we hardly expected, without active aid from our Government, to be able to break such control before the end of the war, but we were animated by a feeling that any success at this time, however small, would not only be to our own advantage but would tend to the patriotic end of assisting in the "winning of the war."

Our representative found that the new Mexican constitution, formulated in 1916, had carefully provided for Government ownership of wireless, in direct response to the urgings of that Pan American Congress which Secretary Daniels mentioned in his statement last week as having the hearty approval of our Government.

The predecessors of Carranza, after Diaz, had already, to some extent, recognized the great desirability of supplementing the land telegraph system with a chain of radio stations linking the outlying Provinces with the capital, so as to lessen the chances of interruption of communications by the numerous bands of roving rebels. A few small stations had been constructed, but far too few and too small to satisfy the need, and when Carranza came into control he at once set about to make improvements. But he had little money and less credit, and nowhere in Mexico were there factories or skilled men

capable of manufacturing wireless equipment. Like other Latin American countries, Mexico depends, in matters of this kind, upon foreign capital and factories, and it was therefore the most natural thing in the world that the Carranza government should fall an easy victim to the wiles of the German Telefunken Co. when they offered to repair the old stations and to finance, erect, and man with competent German operators and engineers new stations, both military and commercial. It is only fair to Carranza to keep in mind, in this connection, that at the time this deal was made both Mexico and the United States were neutral, and the Mexican Government had as much right to buy from Germany as from any other country. Our company would probably have been bidding for the business at that time had it not been for the fact that we had hanging over our heads this menace of Government ownership, which prevented our knowing whether or not we could safely undertake contracts to give an international service to Mexico or any other country.

On the other hand, had such a law as this one here proposed by the Navy Department been in effect at that time, so that the Government of the United States had been the exclusive owner of all radio-telegraph stations and, in addition to that, had the Navy Department been empowered to finance and erect and even man wireless stations in Mexico, it is impossible to imagine that such a deal as the one made by Germans could have been entered upon, for notwithstanding the efforts of our citizens to make the nations to the south of us feel that we only desire to be helpful and just in our relations with them, there exists fear and some distrust and it is out of the question for many of them to tolerate the idea of wireless stations on their soil owned or in any way under the influence of the United States Navy Department.

But it is equally well known that there exists no particular prejudice in the matter of doing business with American private corporations and if our company had been in position to go ahead freely and with the support and cooperation that our business men have a right to expect from the United States Government in their dealings abroad, it might have happened that, instead of there being upward of 25 wireless stations in Mexico under German control, as at present, there would be 25 under American control. And if an American private company were in control in Mexico I am sure that neither Secretary Daniels nor this committee, nor the people of the United States in general, would fail to see anything but a decided military advantage in times of war and an equally valuable commercial advantage in times of peace.

Although the Mexican Government claims title to all these stations, the apparatus is strictly German and there have been German operators in every one of the 25-odd stations. Moreover, there have sprung up Government electrical shops with German superintendents, and the whole system has been supervised by German radio experts who were formerly employed at Sayville and Tuckerton and on the German liners which were interned in this country at the beginning of the war.

Leaving out of consideration the military thorn in the flesh that this system in Mexico has been to us during the war, we must recognize in it an even greater disadvantage and handicap to our mer-

chants and manufacturers in the days to come when they are fighting for a reasonable share of the trade of Mexico.

If the Pan-American Wireless Telegraph & Telephone Co. were placed in position where it could go forward freely with its plans to establish stations in the various Central and South American countries, connecting with like stations in this country, all built and operated by Americans, for the exclusive purpose of handling Latin-American communication, American business would receive an advantage beyond calculation. Our company's success will depend upon its ability to foment business at both ends of the line, and our representatives will be in reality the most aggressive and enterprising commercial agents which this country could have, and while this would not hold quite as true in those countries which have followed our Government's advice in the adoption of the idea of Government ownership of wireless, there is no country to the south of us which does not depend for its equipment of this character upon foreigners, and most of them would be compelled to leave the operation and supervision to foreigners also. So that wherever we would succeed in establishing ourselves, there would be Americans controlling one of the vital arteries of communication.

Much stress was laid by the proponents of this bill on the economic loss which would result from private companies entering the high-power field.

Really, the greatest loss to private companies from the uncertainty of the situation. Private enterprise may be trusted not to spend its money recklessly, but how is it possible to finance large undertakings when the Government throws its wet blanket of ownership over wireless enterprise?

Emphasis, too, was laid on the fact that in private ownership of wireless the art would suffer because private companies could not afford to keep up with the rapidly changing conditions.

In this, as in all matters of private enterprise, competition must be met, and where it can be shown that improved apparatus will increase the capacity of the circuit and thereby add to its revenue, no enterprising company would hesitate for a moment to scrap the obsolete machinery. Indeed, this is what the Marconi Co. has already done. The apparatus which was installed in our New Brunswick, N. J., station for communication with England and which was ready for test when the war began, has since become obsolete and has been removed. At our Marion, Mass., station, built for communication with Norway, we also scrapped apparatus which, although being the latest thing in the art when the station was started, became obsolete before the station could be completed, and we have installed the new timed spark, which Capt. Todd mistakenly described as obsolete and admittedly so by the Marconi Co., which is far from the facts; indeed, we hope to demonstrate that the timed spark will meet all of our high expectations.

Much has been said about coastal stations and of the recent transfer by the Marconi Co. to the Government of its chain of small coast stations.

It is perhaps unnecessary for me to say to this committee that the Marconi Co. gave up this part of its business very reluctantly, I might say even sorrowfully. While we have always looked upon

capable of manufacturing wireless equipment. Like other Latin American countries, Mexico depends, in matters of this kind, upon foreign capital and factories, and it was therefore the most natural thing in the world that the Carranza government should fall an easy victim to the wiles of the German Telefunken Co. when they offered to repair the old stations and to finance, erect, and man with competent German operators and engineers new stations, both military and commercial. It is only fair to Carranza to keep in mind, in this connection, that at the time this deal was made both Mexico and the United States were neutral, and the Mexican Government had as much right to buy from Germany as from any other country. Our company would probably have been bidding for the business at that time had it not been for the fact that we had hanging over our heads this menace of Government ownership, which prevented our knowing whether or not we could safely undertake contracts to give an international service to Mexico or any other country.

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It is perhaps unnecessary for me to say to this committee that the Marconi Co. gave up this part of its business very reluctantly, I might say even sorrowfully. While we have always looked upon

the ship-to-shore business as a collateral branch of our service, our main scheme being world-wide wireless in competition with the land lines and cables, yet wireless having begun as a ship-to-shore proposition, and because of its great rôle and part as an agency of humanity and its honorable record in the saving of countless lives and much property, we hoped to continue it as a life-saving agency and to add to its efficiency and efficacy in every way we could by the employment of invention, improvement, and the closest supervision.

The history of the causes which led to our sale of the coastal stations, which was referred to at this hearing last week, will be told by our commercial manager, Mr. David Sarnoff, who will follow me.

Now that the Government has purchased practically all of the coastal stations, the Marconi Co., of course, agrees that the Government should exercise the closest supervising regulation and control of all wireless communication, especially should it safeguard wireless communication between ship and shore for the reason that safety of life and property at sea is more dependent upon wireless as a means of communication than is the case in any other situation or circumstance on land. Hence the vital and imperative need that every reasonable safeguard and regulation should be exercised and maintained in time of peace, as well as in time of war.

The Marconi Co. further agrees, because it solemnly believes it possible and wholly practicable, that a fair and just division of the paths of universal ether can and should be marked out by which the several interests—Government, private, and amateur—may travel, each in its serious and practical way, each without interference with one another and yet each given full scope and opportunity to develop and expand and to serve the common good.

So much has been said as to the difficulties in the way of such a scheme; let us take up the task seriously and patiently. It is the inherent weakness in mankind that voices the ever human slogan of "it can't be done," which is the reason why there are relatively so few persons in the world who really accomplish constructive things.

If those who pioneered in wireless had not pushed and persevered and overcome interference, and interference, and then, again, countless interferences, the art would have remained undeveloped, if, indeed, it had not died a-born. Thanks, however, to these staunch souls, these men of strong faith, difficulty after difficulty was overcome, obstacles removed, and the wonder and the miracle of the art defined and developed, step by step.

Shall we now say, with the original doubters, that the end has been reached; that no further improvement is possible, that we shall rest with what has been accomplished?

That we have only touched upon the possibilities of wireless is my honest belief, and one need not possess the gift of prophecy to promise to the world even greater things than those already accomplished.

I wish, in closing, to offer to this committee something in the way of a concrete plan, with the view to putting an end to this costly controversy between the Government and private companies, which, more than anything else, has retarded the development of wireless and which, if persisted in, will keep the United States in the back-ground as compared with other nations.

Leaving out all questions of manufacture, patents, and other questions which will tend to cloud and confuse the subject, let us divide the activities of wireless into three divisions:

First. The ship to shore.

Second. High power for transoceanic and transcontinental communication, embracing also medium power for point-to-point overland communication.

Third. The interests of the student and amateur.

Now that the Government has purchased the coastal stations, they should be given full opportunity to operate them. Therefore, I propose the following:

First. The Government shall have the exclusive opportunity for ship-to-shore wireless communication, either by telegraph or telephone, or both, and the exclusive right to conduct commercial business for the public between ship and shore.

Second. Private companies shall be given the exclusive opportunity, supported by Government sanction and influence, to develop and extend commercial high-power and semihigh-power operation, transoceanic as well as point-to-point overland wireless communication.

Nothing in these propositions shall authorize the Government to conduct any commercial wireless communication except the ship-to-shore business aforesaid.

Third. With respect to the student and the amateur, the amendment proposed and which has been before the committee, seems an equitable solution of this problem, as it appears to represent the joint views of the Navy officials and the representatives of the amateurs, and is apparently satisfactory to both sides. Therefore, the Marcom Co. is glad to add its voice in approval and to express the opinion that the proposed regulation governing amateur radio operators and amateur radio stations is both sound and equitable.

With a view to harmonizing the different interests, provided some such plan as the one I have suggested meets with general agreement, I offer the following suggestions:

The Secretary of Commerce shall continue to exercise the powers conferred upon him by the act of 1912 in the matter of licensing privately owned radio stations. To meet the rapidly changing conditions of the radio art, and to apportion wave-lengths ranges best suited for Government, private commercial, and amateur stations, it is recommended that a national radio commission be appointed under an act of Congress, the commission to consist of five members, as follows:

Two designated Government officials and two representatives from the principal commercial operating radio companies.

This commission shall keep abreast of the radio art and shall determine and issue suitable regulations for the harmonious operation of all radio stations under the jurisdiction of the United States, and shall recommend to Congress such additional legislation as in its judgment may be necessary from time to time.

In case an application for license for radio stations is refused or revoked by the Secretary of Commerce, the applicant shall have the right of appeal to the national radio commission, which shall hear the evidence in the case and the vote of a majority of the members on such appeal shall be considered final.

With the idea of meeting the objections of the Government and obtaining its approval of the plan, I suggest for the operation of transoceanic and transcontinental wireless circuits, I beg to offer, on the part of the Marconi Co., the following:

In order that the privately owned high-power stations located in the United States territory shall always be in readiness for Government operation and control in case of riot, tumult, disorder, war, accidental catastrophe, or other emergency, said companies shall employ only American citizens to operate such stations; such personnel shall be attached to Government service as to be subject to impressment at any time or such force shall constitute an arm of the reserve force of the military power of the Government.

The Marconi Co. will further agree to erect its stations within such reasonable time as in the judgment of the Government may be required, and, generally, will agree to such terms and conditions as to the carrying on of commercial business as, by arrangement with the executive departments, may be found reasonable and just. It will give preference at all times to Government messages.

The CHAIRMAN. Did you say anything, Mr. Nally, about the control of rates for wireless transmission?

Mr. NALLY. I did not.

The CHAIRMAN. What is your notion about that?

Mr. NALLY. About controlling rates?

The CHAIRMAN. Yes.

Mr. NALLY. I think that the public should be free to compete freely.

The CHAIRMAN. Well, what other company would there be, under your scheme, except the Marconi Co.?

Mr. NALLY. We could compete with the cables—we would compete with any wireless company. I do not ask for exclusive right for the Marconi Co.

The CHAIRMAN. You referred to the constitution of Mexico. I was not sure but I understood you to say that the constitution of Mexico provided for government ownership and control of the wireless in Mexico?

Mr. NALLY. Yes, sir; that is a law recently passed, as a result of the Pan American Conference.

The CHAIRMAN. And under that policy the Government of Mexico does hold all wireless stations there, but the apparatus used is of German manufacture, and the stations are in control of German experts?

Mr. NALLY. Yes, sir.

The CHAIRMAN. Is that the policy of other Central American and South American countries that those stations shall be Government owned and controlled?

Mr. NALLY. The only country that I can speak positively about is Brazil. There, also, has been passed a measure of that character. But the law provides that a "national company"—that is, a company organized in Brazil and made local, as we make local companies here—can be given privileges by the Government; in other words, by incorporating a local company there, complying with the requirements of a "national company," a private company can operate.

The CHAIRMAN. How can you operate in Mexico, in view of their constitutional provision that the wireless shall be under Government ownership and control?

Mr. NALLY. We do not think we could obtain rights there now for a station to be owned outright by a private company. We think we could arrange to have a station built there, where a private company, say the Marconi Co., would have an interest but not have control.

The CHAIRMAN. That is, it would be a Government station?

Mr. NALLY. The Government of Mexico would probably want to own 51 per cent of it.

The CHAIRMAN. I wish you would make a little clearer your notion as regards the control of wireless, the ship to shore, by the Government; the international high-power stations by the Marconi or some other company or companies; and in each instance taking care of the amateurs. Did I understand you to say that you will agree that the Government shall take over and control absolutely all the ship-to-shore stations, including commercial stations from ship to shore, and vice versa?

Mr. NALLY. Yes.

The CHAIRMAN (continuing). That ought to be under governmental control, and you would not have any objection to its being under direct control of the Navy, for the reason that the Navy is bound to maintain stations for the service of the fleet?

Mr. NALLY. I will further say, Mr. Chairman, that I recommend that that be done, that the Navy be given control; that they be given full rights to operate those stations for commercial business.

The CHAIRMAN. That would leave the international field for private enterprise, would it not?

Mr. NALLY. Yes.

Mr. WHITE. And it would leave continental United States for private enterprise?

Mr. NALLY. Yes.

The CHAIRMAN. Yes; all except the ship to shore. That is, the inland and high power would be left to private enterprise?

Mr. NALLY. High power and so-called medium high power.

The CHAIRMAN. Yes. Have any members of the committee any questions to ask Mr. Nally?

Mr. BURROUGHS. What are your reasons, Mr. Nally, for making that recommendation?

Mr. NALLY. My recommendation, in the first place, is, in view of the fact that we have lost the stations and the further fact that under the new order of things, the result of the war, which will be very fully explained by our commercial manager, instead of the Marconi Co. having 95 per cent of all the ships equipped with wireless there have been perhaps 4,000 or 5,000 ships equipped since the war with apparatus owned by the Government. So that the Government now actually monopolizes the ownership of apparatus on ships.

Mr. BURROUGHS. Suppose the Government were not in that position at this time, would you still have the same view of it?

Mr. NALLY. No; I should very strongly wish to have our stations back and be free to carry on the ship-to-shore business as formerly.

Mr. BURROUGHS. It is, then, largely because of the facts of the present situation and the Government having acquired those stations that you now take that view?

Mr. NALLY. Entirely because of that fact.

The CHAIRMAN. Do you not recognize the fact, Mr. Nally, that it is necessary for the Government, for military purposes, to retain and control ship-to-shore service in the interest of the Navy?

Mr. NALLY. I do recognize that, Mr. Chairman, and I recognize, too, that there are certain potent reasons in favor of the Navy's contention in respect to ship-to-shore business.

The CHAIRMAN. Yes; and for that reason——

Mr. NALLY (interposing). But those reasons have become more important and more urgent by reason of the conditions growing out of the war.

The CHAIRMAN. Yes; I understand the Government has taken over your shore stations and has now installed wireless apparatus on the majority of the commercial ships at sea.

Mr. NALLY. Yes.

The CHAIRMAN. And that condition only emphasizes the fact that there should be governmental control of the ship-to-shore business under existing conditions?

Mr. NALLY. I think so.

The CHAIRMAN. Are there any further questions?

Mr. SAUNDERS. Yes; I would like to ask a few questions about this art. As I understand, Mr. Nally, your reasons with respect to this ship-to-shore communication, for favoring Government control of it, are practical reasons, growing out of the present conditions rather than scientific reasons making it necessary?

Mr. NALLY. Yes, sir; that is quite right.

Mr. SAUNDERS. Now, I wanted to ask you some questions relating to the art in other directions. I gathered the other day, as the effect of the testimony of the witnesses who testified here in behalf of the contention of the Secretary of the Navy, that they did not consider, apparently, that there was much field for point-to-point development, in a commercial way, for wireless in a continental United States. I wanted to ask you whether, with your knowledge of the art and what you conceive to be the possibilities of the art, whether, in your judgment, there is not a great field for development along that line—commercial development?

Mr. NALLY. I think there is. I think that is the big thing that lies in the future. I believe that wireless trunk lines will take the place of transcontinental wire lines. I believe it will be possible instead of spending \$30,000,000 for a telephone-pole-and-wire line between New York and San Francisco, for instance, to have the trunk line a wireless line for such telegraphic and telephonic communication.

Mr. SAUNDERS. And so, I presume, that logically under that scheme there would also be communication between points closer together—I mean shorter internal lines.

Mr. NALLY. Yes. I want to say frankly, Mr. Saunders, that the one great thing against the commercial development of that idea from a revenue standpoint, perhaps, is the low toll rate—the low telegraph rate which would exist in average point-to-point communications for commercial purposes. I think that the point-to-point *wireless communication* will be largely used as an adjunct for pri-

vate enterprises and will be used, as in the cases you suggested, by cotton mills, between mines in remote places, between oil-pumping stations, etc. And I think that its uses in connection with the operation of railroads will be one of its very greatest opportunities.

Mr. HARDY. As I understand, you think that the wireless would be cheaper than the telegraph?

Mr. NALLY. Yes, sir.

Mr. SAUNDERS. According to this proposed amendment to the bill, to which you have referred in your statement, and which I have just glanced over, it seems practically to turn the amateur operators and experimenters loose, so far as operating their little plants is concerned?

Mr. NALLY. Under a very restricted wave length.

Mr. SAUNDERS. What I mean is, of course, they would have to get a license, but there seems to be no limit, under the amendment, upon the wave lengths that they can project.

Mr. NALLY. Oh, yes; there is.

Mr. SAUNDERS. Well, if that is true, and if the figures which have been given to me with respect to the number of those amateur operators are correct, the ether will be filled with those short waves projected by those experimenters and special licensees.

Is there any danger to be apprehended—I presume there is not, or else the Navy Department would not have agreed to it—but I will ask you, is there any danger to be apprehended from the multiplicity of these waves, of their interfering with the ship-to-shore stations?

Mr. NALLY. I believe not. I think they would principally interfere with each other.

Mr. SAUNDERS. Now, with respect to the transcontinental communication and transmarine communication—I believe that is what you call the high-power stations?

Mr. NALLY. High-power stations; yes.

Mr. SAUNDERS. I gathered, and I think it was expressly stated in response to a question of mine the other day, that there was already practically a scientific limit—not a commercial limit—reached as to the high-power stations on the Atlantic shores of the United States.

Mr. NALLY. I know that was stated, but—

Mr. SAUNDERS (interposing). Well, I wanted to ask you now specifically whether, as a scientific proposition, from what you know of the present development of the art, there is any limit to the number of stations that could be used to do this transcontinental or transmarine work without interference with the other?

Mr. NALLY. I think there would be a limit, but I do think it would be a reasonable limit.

Mr. SAUNDERS. As I understand, you can not undertake to fix 12, 15, or 20 stations close together—with regard to the limit as to the number of stations that could be established—so as to work without interference one with the other?

Mr. NALLY. I think we could have many times more wireless high-power stations than there are now cable lines. I believe this country could put up all the wireless stations that will be needed and that they could be controlled and regulated so that there would be no interference.

Mr. SAUNDERS. Practically, then, what you say amounts to this, that it is a commercial rather than a scientific limitation?

Mr. NALLY. No; I think it is a scientific limitation——

Mr. SAUNDERS [interposing]. Well, that is so large, as I understand from you, that you would not undertake to——

Mr. NALLY [interposing]. I do think there is a reasonable limit.

Mr. SAUNDERS. You would not undertake to name any specific limit, would you?

Mr. NALLY. For instance, it is generally supposed that high-power stations ought not to be closer than 50 miles to each other on the coast. That is the broad limitation generally considered wise——

Mr. SAUNDERS [interposing]. Well, when you take the Atlantic coast from Maine and around to the Gulf of Mexico, that would allow a pretty large number of high-power stations, would it not?

Mr. NALLY. Yes; of course, but it is not conceivable that there would be that many stations.

Mr. SAUNDERS. Of course, I understand that, commercially, there would be no profit in that number; but I am just speaking now with reference to these scientific possibilities of operating satisfactorily, so far as the patrons of those stations are concerned, in the regularity and exactitude of their work, and from freedom from interference with others, or from being interfered with by others?

Mr. NALLY. Perhaps I could answer that better by citing the case of England, which is, of course, a small country. There they contemplate a very extensive system of high-power stations, to operate with all other countries and with their own colonies. They had in mind before the war an imperial chain of stations, that would reach around the world practically; and I do not think that they feared any great scientific limitations.

Mr. SAUNDERS. They have not ascertained that there is any difficulty in their projected scheme?

Mr. NALLY. No.

Mr. SAUNDERS. Now, with respect to the suggestions that commercial companies would not give, commercially, the best service in connection with this business, if they were allowed this field, by reason of the fact that they would keep up to date their plant, their apparatus, we have an immense number of industries in the United States of a technical character. And I believe it is regarded as the pride of American industry, that those plants keep themselves up to date; and in reading the various technical journals, I believe I have seen, time and again—correct me if I am mistaken in that apprehension—that, as compared with foreign industries, the difference between American industries and foreign industries was that the foreign industries sought to make an old machine that was a good one go as long as possible, while the American industries did not hesitate to scrap it when it was brought into competition with something that was more up to date. And that being true of American industry in a large way, is there any reason why it should not be true of this particular industry, with respect to keeping up to date?

Mr. NALLY. It would not be true, Mr. Saunders. As I have stated, we have already scrapped a lot of apparatus that we had never used, because the art had changed before we could use it.

Mr. SAUNDERS. Well, so far as the facts are concerned, that contention of the Navy Department, then, is not supported by the facts?

Mr. NALLY. No. It is so very obvious that a commercial company

that wishes to compete for business must increase its carrying capacity, and that the cost of new apparatus to increase the capacity is so small, comparatively, they would not hesitate to scrap it.

Mr. SAUNDERS. Would they not be bound to scrap it?

Mr. NALLY. They would be bound to scrap it.

Mr. SAUNDERS. Under the conditions of competition, are you not bound to scrap in order to keep up to date and to keep your patronage?

Mr. NALLY. Yes; there is nothing in the other theory at all.

Mr. GREENE. Your idea, then, of course, is that, with private competition, there would be a very great advance in the art?

Mr. NALLY. I am sure of it.

Mr. GREENE. Let me make this statement in that connection:

Some 30 years ago I went down into the State of Texas with a number of business men from the Northeast. We started out first with an attempt to go down there and develop some business, but that idea petered out. I had been invited, with the privilege of inviting three other men from my own city, to go down there on an expedition which was paid for by private interests to look over the situation. And knowing something of the cotton industry at Fall River, and having seen it grow from small beginnings until it became the largest cotton-manufacturing city in the country, while I was down there a gentleman called on me at the hotel and wanted me to go across the Brazos River and look over a cotton plant. He wanted me to go over there and view a cotton plant with a purpose of interesting New England capital in developing cotton plants through that section. I told him I did not know much about cotton mills, although I had lived in the atmosphere of cotton mills all my life, but my business had been outside of cotton mills.

When we got over there I found that they had some secondhand machinery which came from my own city, Fall River, which had been shipped down there and had the mark of my own city on it. I looked over the plant somewhat critically—not as an expert—and I said, "You can not interest New England capital in a proposition of this kind; your machinery is rusty; it is out of use; you have not used it for a long time; and it was second hand when you bought it." I found three or four plants down there that had second hand machinery with the stamp of Fall River manufacturers on it. I said that proposition was something that no one would look at.

Now, in 30 years, of course, the South has advanced very materially and has come in competition with the North in cotton manufacture; and they now have plants which are equal to our own. In the State of North Carolina, I believe, they have more spindles than Massachusetts has; and other southern States have also made remarkable progress.

There has been that great improvement in the cotton mills of the South; and that has come about without any Government ownership or Government control, but has come out in the line of competition. And it seems to me, looking at that not from a scientific standpoint, because I am not a scientific man, but looking at it from a practical standpoint, that if this industry is left open to the public development of the art, that arises from every-day use—from the experience of the amateurs who have been life-savers to the Navy during the war

in furnishing operators for their plants when they could not have operated without those amateurs—I have evidence of that, from correspondents in my own city and know of the plants that these young men have developed in their own houses and of the improvements that they have made.

In view of all these things, I want to know whether that would not be very much more to the advantage of the art, the improvement of foreign trade which we are now aiming for, and would not be very much broader than any development by the Navy itself? The Navy is broad enough to run the Navy but not broad enough to run the world; not broad enough to establish, because they do not know anything about business, except what they read and what they learn by mixing with the people. And they do not mix with the people; they do not touch the people in their daily lives, as I do, and as every public man does, and is obliged to do in order to keep himself in touch with life and conditions in this country.

The Navy has a plan now by which nobody could get out of the Navy unless they can keep three hours in the water——

The CHAIRMAN (interposing). Are there any other questions?

Mr. GREENE. I wanted to question Mr. Nally.

The CHAIRMAN. Well, I suggest that what we want to get is Mr. Nally's viewpoint, and not to give our own.

Mr. GREENE. Well, I would like him to say whether he thinks my viewpoint is correct or not. I want to bring this point out: Whether you think, as a man—this has nothing to do with any official view—but whether you really think that the wireless art would be likely to develop and improve very much faster under private development and private ownership than it possibly could under the stagnation of Government ownership?

Mr. NALLY. I feel sure that that would be the case, Mr. Greene.

Mr. HADLEY. I would like to ask one additional question, Mr. Nally:

You alluded in your discussion to the probable effect on international relations of the Government ownership and operation of the high-power business. I think you touched upon it in connection with some correspondence of the Secretary of the Navy. But you did not express your views. I wish you would amplify them.

Mr. NALLY. What I meant was that, in the event of war, a privately owned station in Argentina, for example, would have much more show to continue in operation than a station that might be owned in Argentina by the United States Government. I think it would have much more chance to continue in operation than a station that might be owned by the Argentine Government. I think that, being in private hands and working under the conditions under which it would be necessary to work it in order to comply with the Argentine law—and that law requires that we shall have a certain number of Argentine citizens in the Argentine stations—that in the event of war between Argentina and this country, that station would remain in the hands of American owners; that is which would probably not be the case if it were owned and operated by our Government.

Mr. ROWE. When we entered the war, did the American Marconi Co. do practically all the ship-to-shore business on the Atlantic?

Mr. NALLY. Over 90 per cent; yes.

Mr. ROWE. And how about the Pacific coast?

Mr. NALLY. Over 90 per cent everywhere.

Mr. ROWE. And did you own practically all the apparatus on the ships?

Mr. NALLY. Practically all.

Mr. ROWE. You have just stated that the Government had recently taken over this branch of your business?

Mr. NALLY. Yes.

Mr. ROWE. Who negotiated or represented your company in that transaction?

Mr. NALLY. I did.

Mr. ROWE. Before the negotiations began, was there any attempt to remove your apparatus from the ships?

Mr. NALLY. If it is entirely agreeable to you, I wish you would wait until the whole story is told by Mr. Sarnoff. It is such a long story that I did not undertake it; and anything I might say now would anticipate what he will say later, and he will tell the whole story.

Mr. EDMONDS. Before you finish, I would like to ask this: Has the sale been consummated?

Mr. NALLY. Yes.

Mr. EDMONDS. And paid for?

Mr. NALLY. Yes, sir.

Mr. EDMONDS. Would not the same line of reasoning that you say is potent as showing that the Government should own these shore stations follow as to the ships?

Mr. NALLY. I think not. I think there is some difference between the ship-to-shore stations and the high-power stations; then there is the fact, too, that there is more domestic—

Mr. EDMONDS (interposing). I am not talking about the high-power stations. I am talking about the ships themselves. Would not the same reason why the Government should own the shore stations communicating with ships follow as to the ship installations themselves?

Mr. NALLY. That has followed. The Government owns nearly all of the apparatus on the ships. They also purchased from us 330 sets that were in use on the Shipping Board's ships, in addition to the stations. That is, when we sold our ship stations we were compelled to sell our shore stations. This also will be explained more fully by Mr. Sarnoff.

Mr. WHITE. Then this was not altogether such a voluntary transaction as we were given to understand?

Mr. NALLY. No; it was not very voluntary.

Mr. EDMONDS. The statement was made before the committee that the transaction on your part was voluntary. I got here late this morning and I do not know whether you have mentioned that yet in your testimony.

Mr. NALLY. We will read our correspondence with the Navy Department, which will tell the whole story.

Mr. EDMONDS. You will read your correspondence with the Navy Department?

Mr. NALLY. Yes, sir.

Mr. EDMONDS. Who did the negotiating on behalf of the Navy Department?

Mr. NALLY. Several of the officers. It started originally with Commander Hooper; then with Commander Le Clair; and later finished by Commander Hooper.

Mr. HARDY. Will you allow me to ask you a few questions?

Mr. NALLY. Yes, sir; certainly.

Mr. HARDY. I understood you to say that prior to the war your company did 90 per cent of the business on the Atlantic and Pacific coasts?

Mr. NALLY. All ship-to-shore business.

Mr. HARDY. All ship-to-shore business. What I wanted to get at was this: How about a resulting monopoly? Can any competition be sustained against a well and strongly established and widely disseminated system already in existence and backed by plenty of money? Take the Marconi Co., for instance. When you have 90 per cent of the existing business, your stations are established along the shore where you find your business. Is it practicable for any little company or any outsider to come in and establish any competition with you?

Mr. NALLY. It has been done, Judge Hardy.

Mr. HARDY. Has it ever been successfully done?

Mr. NALLY. It has been done.

Mr. HARDY. Was it successful?

Mr. NALLY. Well, to the extent that it is still in force—there are quite a number of competitive companies. We feel that they are not rightfully our competitors because all have infringed our patents.

Mr. HARDY. Well, I want a frank and full statement along that line. Is not this business, practically and necessarily, a monopoly by the company that occupies the field effectually first?

Mr. NALLY. So far as the ship-to-shore business is concerned, it is better as a monopoly.

Mr. HARDY. That is exactly what I wanted to get at. A number of independent companies would have a hard road to travel after one big company got all the required stations, would it not?

Mr. NALLY. Well, I want to be entirely frank—

Mr. HARDY (interposing). That is what I want.

Mr. NALLY. Before the war, when the total American merchant marine consisted of about 600 ships that carried wireless apparatus, then it would, as you say; but now, with that number increased by thousands and with that much larger field than ever before provided, these other companies would be free, under patents that they own, with apparatus that did not infringe our patents—there is no reason why there would not be a field for them.

Mr. HARDY. But your tendency would be to absorb all useful patents, and in that way prevent outsiders from competing with you?

Mr. NALLY. Well, we would continue to improve what we had and try to hold all, of course.

Mr. HARDY. As a matter of fact, what you are fairly and reasonably considering or contemplating is that your percentage of the business would increase, and, instead of having 90 per cent, at the end of a few years you would probably have 99 per cent of the business?

Mr. NALLY. We hope for 100 per cent.

Mr. HARDY. You hope, then, for a complete monopoly. Is that not the natural result of private ownership, that the strong companies would gradually weed out the weak ones?

Mr. NALLY. It is the natural result of good service.

Mr. HARDY. The natural result, then, of private ownership is monopoly?

Mr. NALLY. If it is good service.

Mr. HARDY. Of course, the interest of the company would be to give good service, to the extent——

Mr. NALLY (interposing). Naturally, that is the thing that dominates every effort in every enterprise.

Mr. HARDY. Your interest would be to give good service, and if you gave good service the result would be monopoly; is that correct?

Mr. NALLY. In other words, we would have it so that whoever wanted good service would have to come to us.

Mr. HARDY. It would be like all other business; a great established business would not have much trouble in driving out weak, independent interlopers, would it?

Mr. NALLY. No; I think not.

Mr. HARDY. Let me ask you another question along that line: Take it for granted that the natural tendency would be to monopoly by some big private company; after you have obtained the monopoly, would not your tendency then be, as to patentees, to hold them down, they having only one market in which they could sell their inventions? The enterprising inventive genius of America would have to come, so far as wireless is concerned, to your company alone, after you had obtained a monopoly of that business?

Mr. NALLY. Well, you see, you are confusing things. You started out with ship-to-shore business. I explained that ship-to-shore business is only a very small, collateral branch of wireless.

Mr. HARDY. I am starting out with the proposition that you suggest, that the private commercial interests should control this wireless, and especially the inland stations, and the next proposition is that that would result in a monopoly. Now, when it did result in a monopoly, would not the inventor have to deal with that monopoly?

Mr. NALLY. Not necessarily so; provided the inventor could invent something that would be better than anything the Marconi Co. had.

Mr. HARDY. Would he not run across this condition, that if he undertook to deal with an independent he would be dealing with a weakling who would be almost sure to be crushed out by your company?

Mr. NALLY. I do not think that is true.

Mr. HARDY. And, in addition to that, would you not have countless ways in which you could tangle up and obstruct any benefits he might derive from his patent, by litigation, claiming that it was not new—or whatever those methods are?

Mr. NALLY. I do not agree with you on that.

Mr. HARDY. Do you not recognize the fact that an old-established company can interfere, by litigation, and destroy practically all the benefits that a poor inventor gets, if he does not submit to its terms and sell his patent at their prices?

Mr. NALLY. I can see that all of those things could be done; but that does not argue that they will be done or have been done.

Mr. HARDY. Unless your company shall be altruistic and ready to give to the inventor what his invention is worth—if they shall be disposed to make him take whatever they want to give him, then they can obstruct him by those methods, can they not?

Mr. NALLY. Well, that has not been the history of such things. The Bell Telephone Co. had a monopoly. Prof. Pupin, as “a poor inventor,” came around to them with an invention worth \$1,000,000, and they paid him \$1,000,000 for it; they did not try to get it for \$10 or \$100 or \$1,000. The Bell Telephone Co., and all large companies of the kind, are on the lookout all the time for inventions to improve the service.

Mr. HARDY. You think, then, that a monopoly would be just as fair to an inventor as if his invention had some competitive buyers?

Mr. NALLY. I think not only that they would be as fair to him, but I think they would be fairer to him, because they would be capable of being fairer; because they have more money with which to pay for inventions than a small company.

Mr. HARDY. And do you think that a private monopoly would be fairer in its treatment of an inventor than a Government monopoly would be?

Mr. NALLY. I think so; yes, sir.

Mr. BURROUGHS. As illustrated by the purchases made of the telegraph and cable business by the Post Office Department.

Mr. HARDY. I just wanted to ask you, along that line, one other question: Do you not think a private monopoly, having well-established apparatus and equipment, would be slow to scrap that costly apparatus that they had for a new invention unless they were compelled to do so in order to retain the business?

Mr. NALLY. I certainly do not think anything of the kind. I think that any company smart enough to build up a monopoly is smart enough to keep it; and no company can keep a monopoly by reactionary or obsolete methods, as it is absolutely necessary in order to maintain a monopoly to keep the service up to date.

Mr. HARDY. Your opinion is, then, that any big company having an installation of costly machinery would not hesitate to scrap it and install very expensive new machinery?

Mr. NALLY. Not for a minute.

Mr. HARDY. There would not be any tendency of that kind?

Mr. NALLY. No; not the slightest.

The CHAIRMAN. I think the history of our Patent Office would show that there are powerful companies in this country who have very valuable plants and who are rendering reasonably good service and have been doing so for the last 30 years, when some new invention came along which threatened to revolutionize their processes, by some hook or crook, bought it up rather than to go to the expense of scrapping the expensive plant and organizing along the lines of utilizing the new invention, and that by buying at an extremely small price to control them rather than to scrap their plant or revolutionize their methods of doing business; and I think you take an altruistic view about it. But, as I understood you, a private monopoly is preferable to a Government monopoly, because of being altruistic, and that the people and the inventor would get a square deal under private monopoly; is that your view?

Mr. NALLY. Yes, sir.

The CHAIRMAN. Now, about control: I assume that this is an issue, whether or not the Government or the Marconi Co. shall monopolize the wireless of ship-to-shore stations or in the continental or international business, because up to date no other company has had the courage to enter the field and contest seriously with the Marconi Co., and I am not saying whether that is desirable or not—but about the control, I think you will agree with me that the Marconi—and I will say that so far as I know their management has been clean and capable and progressive; and if we are to have a private monopoly, there is no other company I would like to have control it more than your company, but divorced absolutely from foreign control or ownership.

Mr. NALLY. If foreign control or ownership were hurtful to it, I should say yes. But why do you single out the Marconi Co.

The CHAIRMAN. Because it is the case of the company under discussion.

Mr. NALLY. How about the cables and the telegraph and the ships and everything else?

The CHAIRMAN. So far as ships are concerned, under the American flag, we have tried to divorce them from foreign control by legislation. And, now, the British Marconi is, to all intents and purposes, a government control instead of private, is it not?

Mr. NALLY. It is not, sir.

The CHAIRMAN. Have they any other agencies for international intercourse by wireless than the Marconi?

Mr. NALLY. Why, yes; they have their own agencies.

The CHAIRMAN. What are they?

Mr. NALLY. The British Government has its own shore stations, and they also have several admiralty stations for purely military purposes.

The CHAIRMAN. I am speaking about commercial business. I am asking for information, because I have no knowledge about it.

Mr. NALLY. You see, Judge, this high-power transoceanic and transcontinental wireless is a "new baby." It was born just when the war broke out, and its growth has been retarded ever since. None of these high-power circuit projects which were planned about the time of the war have been able to operate except in the way the governments have operated them, and private enterprise has not been given full opportunity as yet in transoceanic communication.

The CHAIRMAN. Ought they not to be American owned and controlled?

Mr. NALLY. They are American owned and controlled.

The CHAIRMAN. You said that one-third of the stock in your company is owned by the British Marconi?

Mr. NALLY. I said one-fourth.

The CHAIRMAN. It would be desirable if all of it were American owned, would it not?

Mr. NALLY. But its stock is nonvoting.

The CHAIRMAN. By virtue of the constitution and by-laws of your organization?

Mr. NALLY. No. They have agreed to make it nonvoting.

The CHAIRMAN. The British Government, then, speaking plainly, would have no control over your company directly or indirectly?

Mr. NALLY. The British Government, strictly speaking, has no control at all over the British Marconi Co.

The CHAIRMAN. Are you certain of that?

Mr. NALLY. I am sure of it; yes.

The CHAIRMAN. In your investigations of conditions in Mexico and in Central America, have you secured copies of their constitutions and statutes concerning the ownership and control of wireless that will be available to the committee for information?

Mr. NALLY. I have not any with me; no, sir. But we have such documents.

The CHAIRMAN. If you have, we would be glad to get it, as I would like the committee to obtain all the information it can on this subject.

Mr. NALLY. I think I can get them for you.

The CHAIRMAN. We would be obliged to you if you can do so.

Mr. GOODWIN. What countries have developed this art most extensively?

Mr. NALLY. I think the United States and England.

Mr. GOODWIN. What countries have nationalized these activities of wireless intelligence?

Mr. NALLY. The only countries that I can recall are Japan, China, I think Norway, and I suppose Mexico. But Great Britain, United States, Germany—I am not able to say now positively about France or Italy, because there are no commercial high-power stations operating in those countries. But the countries that have most developed high-power wireless have left the development in the hands of private companies; that is, England, Germany, and the United States.

Mr. HUMPHREYS. May I ask a question, Mr. Chairman?

The CHAIRMAN. Oh, yes.

Mr. HUMPHREYS. I want to go back to that question of monopoly of ownership and operation, the different aspects of the question, not economic but scientific. In your opinion, is it necessary for one central control, either in private ownership or Government ownership, in order to prevent the interference in the waves?

Mr. NALLY. I have not gotten your question clear. Do you mean so far as private ownership or so far as I suggested?

Mr. HUMPHREYS. It has been suggested here that there must be a monopoly of operation, either in Government or in some one privately owned and operated company, in order to prevent interference in the ether.

Mr. NALLY. I do not think that is necessary. If some national radio commission with powers such as I suggested to regulate wireless is constituted, I do not think then that it makes any difference.

Mr. HUMPHREYS. I just wanted to get your opinion on that subject. Now, one other question: We have two kinds of monopoly, one by law and the other by merit, we may say. Your object was to go out and fairly win 100 per cent of the business?

Mr. NALLY. Yes; that is our object.

Mr. HUMPHREYS. If you failed to avail yourselves of the inventions that were made, that would add to the economy of the service; then, of course, your hold on the public favor and patronage would be to that extent jeopardized?

Mr. NALLY. We would lose it, Mr. Humphreys.

Mr. HUMPHREYS. Whereas if you had a monopoly by law you could or not, as you chose, adopt any improvements that were presented, and nobody else could take it if you had the monopoly under the law?

Mr. NALLY. If there is an improvement in wireless, an improvement of the kind that you had in mind, something that will make a capacity for 100 messages where perhaps we had a capacity for, say, 10 messages before?

Mr. HUMPHREYS. Yes.

Mr. NALLY. It is inconceivable that any private company having bought a device that may increase their capacity twofold or fivefold or tenfold or thirtyfold would not accept it. If they did not do it the inventor could very easily find capital to build a competing system that would force the reactionary company out of business.

Mr. HUMPHREYS. That is where a monopoly is not by law?

Mr. NALLY. Yes.

Mr. HUMPHREYS. Is there any reason why, assuming that your company had gone out and gotten 100 per cent of the business, or 90 per cent, the Government could not regulate your rates and practices under the law as fairly as they have the rates of the railroads and telegraph companies?

Mr. NALLY. There is no reason.

Mr. HUMPHREYS. So that the Government could very readily prevent your adopting extortionate rates or oppressive practices even if you had the monopoly of the business?

Mr. NALLY. I will state as a case in point an instance where we did have a patent monopoly by reason of a certain invention, the high-frequency invention, under which we took a license, and for which we had to pay the National Electric Co. 20 per cent royalty. The National Electric Co. lost out in litigation with another company, and although we had a contract with the National Electric Co.—under which we had a right to cancel on 90 days' notice—we took the chance and canceled that contract, and then we voluntarily reduced the rental on 500 ships an amount equal to what we had been paying the National Electric Co. under the contract. Although we had contracts with all our shipowners requiring them to pay us \$1,200 a year, we reduced it to \$1,000.

Mr. HUMPHREYS. Do you expect to engage in transoceanic business in competition with the cable companies? What do you think of the desirability of forbidding by statute any interlocking directorates between the two companies—the Cable Co. and the Marconi Co.?

Mr. NALLY. I think that is already forbidden in the Sherman Act and subsequent statutes.

Mr. HUMPHREYS. That is forbidden?

Mr. NALLY. Yes.

Mr. HUMPHREYS. And you think that would prevent any agreement that would eliminate the competition between the two?

Mr. NALLY. I think it would prevent it.

Mr. SAUNDERS. In view, Mr. Nally, of the direction this inquiry has taken, I would like to ask you two or three questions. Having in mind the suggestions embodied in the questions of Judge Hardy, is not the logic of that some action in relation to the patent laws rather than to Government ownership of this particular enterprise? In

other words, is not the logic of what he had to say about a strong company backing some particular invention, and therefore being able to drive other competitors out of the field, applied to everybody who invents something new, something which no one else can operate under the patent laws of the United States?

Mr. NALLY. Yes, sir.

Mr. SAUNDERS. He has got a hold of something which nobody else can utilize. He forms a company which, by virtue of the merits of that particular proposition, soon enlarges and becomes a big company. How can you break in on that except with a new invention, or, so to say, scrap the old invention, so that all of the suggestions that in a general way would apply in this connection to the Marconi inventions would apply to every other invention which was patented under the laws of the United States?

Mr. NALLY. Yes, sir.

Mr. SAUNDERS. With respect to this particular invention the conditions between one company that hold an invention or improvement in this field and another company—is not here one radical difference between this and any other field of enterprise that it is a basic field that nobody has a right to enter, nobody can get a patent to use the other; it is a patent on some instrumentality using the other? Are the Marconi people the only people holding patents on methods agitating the ether, setting in motion these waves which are being taken up at the other end for the transmission of intelligence?

Mr. NALLY. There are some other patents.

Mr. SAUNDERS. You do not hold any exclusive patent in this field?

Mr. NALLY. No.

Mr. SAUNDERS. To the extent that these other patents offer as good service as you do or conceivably a result of their particular invention a better service than you do, they are in a position to enter into free competition with you because they have the basic element which you all use and which you can not crowd them out of except by adopting superior instruments for the transmission?

Mr. NALLY. Yes. The same situation exists with regard to the land telegraph.

Mr. SAUNDERS. In the telegraph, of course, you have got to establish your physical wires, so far as that is concerned, but in the field of wireless here is this field ready to be operated by anybody who invents a means of using it. And what I understand you to say now is that you do not hold any exclusive patents on any instrumentalities for the use of the ether, but that there are other competing patents?

Mr. NALLY. There are many others. There are some in which questions are involved which have not yet been adjudicated.

Mr. SAUNDERS. If you hold these competing patents would you be any different from any other patentee of a new invention in that respect?

Mr. NALLY. No, sir.

Mr. SAUNDERS. In respect to this from point to point development in the United States, having in mind the simplicity of the apparatus, that is, the facility with which it can be established within the United States, if there are other inventions as good as yours or even better than yours, how would the size of your company prevent competition between your company and others under circumstances of that sort? Suppose a company wanted to erect two wireless stations, we will say,

to communicate between Washington and Richmond. The only backing that would be required in connection with a company would be, of course, to establish the two plants, one here and one in Richmond, and then the possibilities of return from there. Would not that prevent a fair field for competition on the part of the smaller company with the larger companies?

Mr. NALLY. Where the smaller companies or individuals have patent rights there is nothing in the world to restrict them.

Mr. SAUNDERS. Because they can all get to the ether?

Mr. NALLY. Yes.

The CHAIRMAN. Your object, then, would be to have the instrument to get to the ether, and they control the instruments?

Mr. SAUNDERS. I understand not.

The CHAIRMAN. Nobody has got a patent right on the ocean.

Mr. SAUNDERS. Your illustration is just in point. It is destructive to this argument.

Mr. EDMONDS. Germany tried it, but lost out.

Mr. SCOTT. The present plan of the Government, as outlined by the Secretary of the Navy, is to control the high-power stations in the United States regardless of their purpose. I mean by that regardless of whether commercial or military or otherwise.

Mr. NALLY. Control of wireless.

Mr. SCOTT. At the present time the Marconi Co. and subsidiary companies are not operating in many countries. You have not any stations in Canada?

Mr. NALLY. There is a Marconi Co. in Canada, but it is separate.

Mr. SCOTT. A separate company, independent of the British Co.?

Mr. NALLY. And independent of the Marconi Co.

Mr. SCOTT. Have the Marconi Co.—when I say “Marconi” I refer to subsidiary companies also—any stations in South America at the present time?

Mr. NALLY. The American Marconi Co.?

Mr. SCOTT. Any of the Marconi companies?

Mr. NALLY. Yes; there is an Argentine Marconi Co.; there is a Brazilian Marconi Co.; and I think a Chilean and Peruvian Marconi Co.

Mr. SCOTT. At the termination of the war those companies in Great Britain, France, Chile, South America, Canada, and the various other places will operate as they did before the war?

Mr. NALLY. Canada is already operating; they resumed about 10 days ago.

Mr. SCOTT. You make contracts with merchant marine and install the equipment, do you?

Mr. NALLY. Yes, sir.

Mr. SCOTT. And the British Co. and the other companies use a peculiar character of instrument?

Mr. NALLY. Yes.

Mr. SCOTT. That conforms with your sending station or receiving station, as the instance may be?

Mr. NALLY. They have their own type.

Mr. SCOTT. Supposing that you in your progress in connection with sending messages should decide to alter your method of sending, it would necessitate changing the apparatus on shore and ship, would it not?

Mr. NALLY. I do not know just what you mean. You see we are regulated by the act of 1912.

Mr. SCOTT. You mean here in this country?

Mr. NALLY. Yes.

Mr. SCOTT. I am talking about the foreign countries.

Mr. NALLY. It is the same all over; the law is international.

Mr. SCOTT. The point I am trying to bring out is, for instance, whether if the United States Government should take over the Marconi system and operate it it might not develop that while the United States Government was engaged operating the wireless system in this country that the Marconi companies elsewhere, having equipment on a large percentage of the merchant marine—because you will remember that when we got into this war we had less than 10 per cent of the ships on the ocean that were operating under the American flag—it might develop that a large percentage of the merchant marine of the country will be using your instruments, and a new invention would require you to change your instruments on shore and on the ships, and the United States Government would be left with a government-ownership proposition where they would only be able to communicate with a small percentage of the merchant marine; is that a possibility?

Mr. NALLY. It is not a probability.

The CHAIRMAN. I take it that all red-blooded Americans would prefer that American ships be controlled by American companies rather than by foreign?

Mr. SCOTT. I did not get that.

The CHAIRMAN. I take it that all red-blooded Americans would prefer for the American merchant marine to be controlled by American corporations rather than by foreign corporations?

Mr. SCOTT. I presume so.

The CHAIRMAN. Your position is that we should give it over to foreigners?

Mr. SCOTT. If the 14 peace propositions prevail, we will all be one family before long.

The CHAIRMAN. Possibly.

Mr. SCOTT. If the United States Government should take over this project in compliance with the present plan and they should enter the field of commercial work, they would be obliged to communicate from the stations in this country with the Marconi stations in other countries, would they not?

Mr. NALLY. Yes; or with such Government-owned stations as they might be able to find.

Mr. SCOTT. I do not understand that under the present plan the United States Government contemplates building and maintaining stations in South America and various other countries. There was comment made on that fact.

Mr. NALLY. I think that is one of their plans.

Mr. HARDY. If I understand the gentleman's question, it relates to the possibility that the Marconi companies, having practically covered the field of Great Britain, France, Chile, Peru, and South America generally, and Canada, might take it into their heads, in order to nullify the value of the American plan, if it was government owned, to change their instruments and get out of tune. Could

they not do that just as well if there was a private monopoly in the United States?

Mr. NALLY. That is such a remote possibility that it were almost ridiculous to discuss it.

Mr. HARDY. Then, in your judgment, there is no use in contemplating the probability of the Marconi companies elsewhere trying to kill the American company because it is Government owned?

Mr. NALLY. Not any more than for England to attempt to make the English language the language of the world.

Mr. HARDY. So, in your judgment, that is not really an element in the situation?

Mr. NALLY. I do not think so.

Mr. HARDY. But as to this question of monopoly, with reference to the use of the patents, there are hundreds of ways in which big, strong, going business can beat down its competitors, are there not?

Mr. NALLY. There are a hundred ways that people can rob, steal, and murder.

Mr. HARDY. As a matter of fact, is not that a usual way for big business to beat its competitors down?

Mr. NALLY. Not any big business I have been associated with, Judge.

Mr. HARDY. You never heard of the Standard Oil undertaking to destroy competition by underselling and other methods?

Mr. NALLY. I have read of those things.

Mr. HARDY. Do you not know it is a fact that they did for a long time, and do you not know that under the domination of the Bell Telephone Co. it has been almost impossible to establish independent telephone companies even in a small community?

Mr. NALLY. I know the opposite to be the fact, Judge.

Mr. HARDY. You may know the opposite to be a fact in some places, but in my own town I know they tried it and they were driven out of business.

Mr. NALLY. I have had pretty broad experience in that field of investigation. I found there were more independent exchanges, and even more independent telephones, strange as it may sound, than Bell telephones.

Mr. HARDY. Hanging on by the eyelash?

Mr. NALLY. Yes; but usually due to the weak eyelash. [Laughter.] Usually because they did not deserve to succeed.

Mr. HARDY. Was it not because of this fact—

Mr. NALLY. If I may finish, Judge?

Mr. HARDY. Yes.

Mr. NALLY. Because those independent exchanges were run by the butcher, the baker, and the candlestick maker in those towns, and they did not know anything about the telephone, and yet they tried to run the telephone business. That is why they failed.

Mr. HARDY. Was it not also a fact that it was due to their small capital; that they were trying to run an independent concern without as much capital as their competitors?

Mr. NALLY. I do not think so.

Mr. HARDY. Let me illustrate.

Mr. NALLY. I think there has been more private capital wasted on the independent telephone exchanges than there has been invested by the Bell institutions.

Mr. HARDY. Nearly all the independent exchanges have been lost.

Mr. NALLY. Deservedly so, in most cases, because they were very poorly managed; I know that to have been the reason.

Mr. HARDY. The intention was good?

Mr. NALLY. Yes.

Mr. HARDY. Do you think that in this wireless business the independents would have more capital to try to compete with your universal Marconi Co. than the independent telephone companies had to compete with the Bell telephone, that the independents would really have some chance?

Mr. NALLY. If the independents deserved to succeed.

Mr. HARDY. Mr. Nally, just to put it down in plain black and white, do you not know that if this thing is left to commercial enterprise that your company will have an absolute monopoly in nearly all countries in the world?

Mr. NALLY. As much as I might say I would hope for that outcome before I die, yet that is a large order. There are great obstacles ahead. I think, on the other hand, that wireless is going to open up more opportunities for all.

Mr. HARDY. For the butcher, the baker, and the candlestick maker, for those people to dig in with independent companies?

Mr. NALLY. And wireless men. There are more people studying wireless to-day than almost any other technical subject in the world.

Mr. HARDY. That is quite true, but if an inventor had an invention or patent to-day and undertook to put it on the market without consulting your company, would he not have a rocky road to travel?

Mr. NALLY. Yes; because no one would know the value of a patent as well as we, and no one could afford to pay as much for it.

Mr. HARDY. And he would not have as much money to develop it himself?

Mr. NALLY. He would if he had a real invention.

Mr. HARDY. As a matter of fact, if he had the patent, and you were not litigating with him, and nobody else was litigating with him, would he not, if he started to establish a station, be lacking in connections because of his relationships. He would be a single, lone individual like the independent telephone companies, would he not?

Mr. NALLY. I can not agree with you. There never has been as much opportunity for the individual as to-day.

Mr. HARDY. And yet you had obtained before this war 90 per cent of the business in America and expected to run it up to 100 per cent? Where is the independent going to be when you get the 100 per cent?

Mr. NALLY. It is because we are the only company who has developed; we are the only one entitled to it.

Mr. HARDY. Then you are the only people in America who had any enterprise?

Mr. NALLY. Up to this time.

Mr. HARDY. And yet you say there are hundreds of enterprising inventive geniuses?

Mr. NALLY. I am talking about developing. It has taken us 20 years before we developed it sufficiently to pay a dividend. Why talk about a great monopoly and encouraging the individual or the concerns that for 20 years must struggle in order to be able to pay 5 per cent dividends?

Mr. HARDY. When you get your institution up to 100 per cent, you think it is then time to consider a monopoly?

Mr. NALLY. Will you please consider that 90 per cent of 10 would only be 9, and 90 per cent of 500 would be 450, and if there are only 450 ships, does not that mark the limitation?

Mr. HARDY. Do you mean to say that you could not get any more ship business than there are ships?

Mr. NALLY. That is exactly what I mean.

Mr. HARDY. And your monopoly would be limited to the number of ships?

Mr. NALLY. I mean, Judge, all depends on the limits of the field. It is the large field that makes competition.

Mr. HARDY. Was it not complained that your rental of instruments was annually at \$1,000 each, when you sold them for probably \$2,000?

Mr. NALLY. Yes.

Mr. HARDY. How do you account for your altruistic views consistent with the fact that you were charging \$1,000 rental a year on machinery—

Mr. NALLY. Very easily.

Mr. HARDY (continuing). That you sold for \$2,000?

Mr. NALLY. They are not altruistic; they are business reasons. I never claimed that the Marconi business was pure altruism; it is a business proposition, and if you will be patient the manager who follows me, I think, can convince you that while it was not altruism it was fair business.

Mr. HARDY. It is a little argumentative, yet is it not a fact that the prohibition against monopolies, so far as it applies to your own wireless business, in your judgment, was a foolish proposition, and that we ought to favor a monopoly of wireless?

Mr. NALLY. That is your view. I did not entertain it.

Mr. WHITE. It is just what this bill is for, a monopoly.

Mr. NALLY. There is nothing I have said that would indicate we claim absolute monopoly.

Mr. GOODWIN. You stated just now that there had not been such opportunities in the world for individual effort as now?

Mr. NALLY. I said it is so in wireless and everything.

Mr. GOODWIN. But, still, you have a monopoly now of 90 per cent of this business?

Mr. NALLY. I wish you would get that straight. I wish you would understand what 90 per cent means. I answered the question about the ship to shore business. I will state that the ship to shore business was merely a collateral branch of wireless. I said that before the war there were about 500 ships and that we operated about 90 per cent of those. That is a monopoly proposition, as to those ships, but it is a limited monopoly, is it not?

Mr. WHITE. And it had no reference to the possibilities of your business?

Mr. NALLY. No.

Mr. GOODWIN. On what proposition did you hope to get 100 per cent part of the business?

Mr. NALLY. That the others than the 500 ships mentioned that had infringing apparatus might be made to see the error of their ways.

Mr. GOODWIN. Then, what opportunity would there be for individual effort to get anywhere if you get 100 per cent monopoly?

Mr. NALLY. In the future of the art—our patents do not last forever—or incentive to inventors to get away from our control of the patents, if you please. But not to go into competition with us with any apparatus, which they did not have any right or title to.

Mr. GOODWIN. What other patents has your company bought up, if any?

Mr. NALLY. Bought up?

Mr. GOODWIN. Bought and having utilized?

Mr. NALLY. Well, we are utilizing a number of basic patents.

Mr. GOODWIN. How many have you bought that you have not utilized?

Mr. NALLY. I can not tell you.

Mr. GOODWIN. About how many?

Mr. NALLY. I can not tell you.

Mr. GOODWIN. You can make a rough guess.

Mr. NALLY. No; I could not.

Mr. GOODWIN. A half dozen?

Mr. NALLY. A half dozen, or it might be 50; we can not tell. We have patents—take Prof. Pupin's patents, which he refers to, and which we bought but which we never utilized because we have other patents which made that patent obsolete.

Mr. GOODWIN. What is the use of buying patents if you do not utilize them?

Mr. NALLY. Because something better comes into the field, and we scrap the old patent and use the new one.

Mr. GOODWIN. But did you buy with the idea of utilizing, and then did not use the patent?

Mr. NALLY. No; we were not so foolish.

Mr. GOODWIN. Then, do you buy anything that comes along in the way of a patent?

Mr. NALLY. We do not buy everything that comes along; we buy what seems to fit into our business, and we utilize that until something else comes along that scraps it.

Mr. GOODWIN. Do you then seek to develop that to the highest point of efficiency?

Mr. NALLY. Always.

Mr. GOODWIN. And then scrap it?

Mr. NALLY. Scrap it, I say, if something else comes along that is better.

Mr. GOODWIN. Do you scrap that and use the same thing you have had all the while?

Mr. NALLY. Do I scrap and use it, you mean?

Mr. GOODWIN. And use that which you have had all the while?

Mr. NALLY. We can not use it if we scrap it, and we can not scrap it if we use it.

Mr. GOODWIN. No; I say this, do you buy a patent, scrap that, and use the same old patent that you had?

Mr. NALLY. I can not understand your question.

The CHAIRMAN. For instance, why did you buy Pupin's patent?

Mr. NALLY. Because it was good when we bought it.

The CHAIRMAN. Did you have anything as good at that time?

Mr. NALLY. No; or we would not have bought it.

The CHAIRMAN. Why did you not use his patent?

Mr. NALLY. Because we got something that was better afterwards.

Mr. GOODWIN. Is it not a fact that you do buy a great many patents and put them in the "cellar," as the saying goes?

Mr. NALLY. It is not true; it is absolutely untrue.

Mr. HUMPHREYS. There is one matter I just want to get cleared up. You speak of the Marconi Co., and Judge Hardy spoke of this universal Marconi Co. These various Marconi companies have the same name "Marconi," but they have no basis of business relations? You use the word "Marconi" very much as we use the word "telephone" or "telegraph"; is not that the idea?

Mr. NALLY. It is because "Marconi" means wireless.

Mr. HUMPHREYS. That is what I thought. It is not the same company?

Mr. NALLY. No; it means wireless.

Mr. HUMPHREYS. Let me ask you this question. I am interested in this patent matter to some extent, solely from the standpoint of the patentee, disregarding the public interests altogether. You had 90 per cent of the business; that means one thing. There are 12 companies, each one doing, say, 8 per cent of the business, and the patentee has an invention that would effect a saving of 10 per cent of the operating expenses. He comes to you, and you buy his instrument. That would be effecting a saving of 10 per cent or 9 per cent of the business. If, in place of your company, there were 12 companies and he would come to you, his invention would be effecting a saving of 10 per cent or 8 per cent. I say, looking at it solely from the standpoint of the patentee, he would be very much more likely to get a large compensation from you, who had 90 per cent of the business, than he would if he only had 8 per cent of the business?

Mr. NALLY. Yes; because it would increase our business just that much.

Mr. HUMPHREYS. It might mean the saving of money, of hundreds of thousands of dollars, to you yearly, whereas if you had only 8 per cent of the business it would be just one-twelfth.

Mr. SCOTT. Mr. Nally, the question of the value of patents is as much of a controversy with private concerns as it is with the Government, is it not?

Mr. NALLY. Yes, sir.

Mr. SCOTT. The Lewis & Browning case was a matter that was scattered around the country for the edification of the people and was a controversy as to the value of a patent in which the Government solely was interested?

Mr. NALLY. Yes.

Mr. SCOTT. So that the relative merits of a patent can become as enthusiastic a proposition for discussion whether the Government is interested or not?

Mr. NALLY. You are right.

Mr. SAUNDER. Mr. Nally, there is nothing at any time, having in mind experience in other directions, that will hinder you from being displaced by some invention of superior merit to yours, is there?

Mr. NALLY. No, sir.

Mr. SAUNDERS. A few years ago the first, as I recall, successful commercial adding machine was what was known as the Burroughs adding machine, and that machine dominated the whole commercial

world for a time. To-day there are a number of first-class competing adding machines, several of them claiming to be the superior of the Burroughs.

Mr. NALLY. I think it is true also of the typewriter.

Mr. SAUNDERS. It was true also of the typewriter. That applies to your situation, does it not, under the patent laws and under the general conditions in the business world.

Mr. NALLY. Just the same.

Mr. SAUNDERS. In respect to this suggestion that the Bell people, as that has been brought in as a matter of discussion—I want to put a little of that into the record—the Bell Telephone Co. interfering with the independent concerns “hanging on with eyelashes.” Is not, as a matter of fact, this the situation, that a number of these little fellows, thinking that the Bell people were making enormous profits at the rates they were charging, went into the telephone business and charged a much lower toll rate than the Bell people did, one that did not provide for replacements and one which did not provide, as has been the experience of all people who have been in it for awhile, for the increasing expenses that go along with any telephone company as it gets old, and as a result of that found themselves in a few years “hanging on by their eyelashes,” but as a result of their own lack of business foresight and not as a result of any competition or interference by the Bell people?

Mr. HARDY. Won't you let me illustrate by using my home town of Corsicana as an illustration as to just what the facts were?

Mr. SAUNDERS. No; I want him to answer that.

Mr. NALLY. I would like to say I know of numerous instances where independent companies have gone into towns like Corsicana and where they called on leading citizens, and they would picture the enormous profits which these citizens—the banker and the judge and the other prominent citizens—could make by investing in a certain telephone outfit. They then told that story about the poor washerwoman who was compelled to take a share of telephone stock in payment for a bill for laundry, and who held on to it, not knowing its value, and was finally worth \$10,000,000. You hear those stories. They tell the same story about the wireless business. That banker and that judge and prominent lawyer put their money into this local enterprise; they did not know any more about that business than I know about banking or than I know about the law. The man who started that local telephone exchange moved to another city and allowed them to “hold the bag.” He went all around the country and organized other exchanges.

Mr. SAUNDERS. We established in my county one of those local companies. We actually had an exclusive charter. We had a monopoly all right and we started out with the idea that the low rate would pay us these handsome dividends. The Bell people have not interfered; they have given us all sorts of help. Right now they are doing that with respect to interchanging messages and so on. But as time went by, and, as I said, that is the experience of all telephone companies, your expenses increase, and as you increase the number of your phones your expenses increase instead of being reduced as the business increases, and now we are not paying any dividends at all and can not pay them. But the Bell people are not responsible for that situation. [Laughter.]

Mr. HARDY. We were paying \$3 for a telephone for a private dwelling and \$4.50 for offices when the independent company established their system and began to connect their rural connections. They started out at \$2 for a resident and \$3 for an office. The minute they got an established patronage of perhaps two or three hundred customers the other people put their rates down to \$1.25 for a residence and \$2 for offices, and they kept it there for five years until they drove that independent concern out of business.

Mr. SAUNDERS. That was a case of piratical interference; I agree with that.

Mr. EDMONDS. I would like to say that the best investment I have in Philadelphia is in an individual local telephone company—the Keystone Telephone Co.—and I get my dividends regularly. I would like to put in the record, Mr. Chairman, in connection with this, the quotation from the report of the United States census for 1912:

According to the United States census for 1912, there were 1,740 independent telephone companies with over \$5,000 annual income from 12,237,721 stations. Many of these companies connect with the Bell system. The capital invested is approximately \$3,824,000 and the income is about \$48,950,000 per annum.

The CHAIRMAN. The committee will now take a recess until 2 o'clock this afternoon.

(Thereupon, at 12.45 o'clock, the committee took a recess until 2 o'clock this afternoon.)

AFTER RECESS.

The committee reassembled pursuant to the taking of recess.

The CHAIRMAN. The first gentleman to be heard this afternoon is Mr. Sarnoff. You may proceed, Mr. Sarnoff.

STATEMENT OF MR. DAVID SARNOFF, COMMERCIAL MANAGER OF THE MARCONI WIRELESS TELEGRAPH CO. OF AMERICA AND VICE PRESIDENT OF THE PAN-AMERICAN WIRELESS TELEGRAPH & TELEPHONE CO.

Mr. SARNOFF. Mr. Chairman and gentlemen, Mr. Nally stated that I would explain the circumstances which led up to the sale of the Marconi coastal stations and ship sets to the Navy Department, and, without preliminaries, I will proceed to tell the facts, which follow:

The Marconi Co. maintained an extensive chain of coastal stations on the Atlantic, Gulf, and Pacific coasts, as well as on the Great Lakes. These coastal stations were erected for the purpose of carrying on communication with ships at sea and prior to the war were operated by the Marconi Co. in accordance with all the requirements of international laws, as well as the laws and regulations of the United States, which means that these coastal stations were open for service with ships at sea regardless of the system of radio apparatus used by these vessels.

The Marconi Co. leased its apparatus to American shipowners and furnished not only its equipment but trained wireless operators, as well as the necessary maintenance and repair of the apparatus and all other items which are included in a comprehensive wireless service organization. The coastal stations, the ship stations, the wireless

operators, and all the other items of service constituted what has been referred to as the Marconi Co. since its organization was responsible for a large number of vessels carrying wireless apparatus and the excellent service rendered shipowners and the public generally.

The Navy Department manifested its hostility toward the Marconi rental system wherever and whenever it had an opportunity to do so and, through its various agents, encouraged those who endeavored by the outright sale of infringing apparatus and ruthless competition to make inroads upon the Marconi rental system.

Although this attitude on the part of the Navy Department made matters extremely difficult for the Marconi Co., yet we persevered in the face of these hardships, and when our country entered the war the Marconi Co. maintained its wireless apparatus on over 500 American merchant vessels, as well as its chain of coastal stations, numbering 45.

When our country severed diplomatic relations with Germany, Mr. Nally, the vice president and general manager of the Marconi Co., at once telegraphed the President of the United States as follows:

FEBRUARY 3, 1917.

His excellency Hon. WOODROW WILSON,

President, United States of America, Washington, D. C.

The Marconi Wireless Telegraph Co. of America, in accordance with the act to regulate radio communication approved August 13, 1912, hereby places at the disposal of the Government for use in any emergency, its entire organization and personnel, including its high-power and coastal stations wherever situated, its manufactories, work shops, and trained staff. Myself, associated officials, and staff are subject to your orders or to the orders of any particular department of the Government which may need our services. I shall be glad to proceed to Washington for conference if you so desire.

EDWARD J. NALLY,

President and General Manager of

Marconi Wireless Telegraph Co. of America.

Immediately upon the declaration of war by the United States the Marconi Co. turned over to our Government its entire system of coastal as well as high-power stations in this country.

Just as soon as the Navy Department obtained complete control of all wireless stations and operations in the United States, it followed a line of action which appeared to us calculated to destroy the Marconi rental system and to render the Marconi coastal stations worthless at the end of the war, so that no alternative would be left the Marconi Co. except to sell its coastal stations to the Government. So well were these plans of the Navy Department laid and followed, that the ends sought by them were obtained even before the war terminated.

The United States Shipping Board, having requisitioned about 300 American merchant vessels equipped with Marconi apparatus and operated under the Marconi rental contract, made no request to the Marconi Co. that it terminate the rental contracts and sell the apparatus on these ships. On the contrary, our relations with the United States Shipping Board were at all times most cordial. In fact, the New York branch of the United States Shipping Board entered into a contract with the Marconi Co. immediately upon the declaration of war for the repair of the radio equipment on over 30 German vessels interned in various parts of the United States, the German apparatus on these ships having been damaged and in some cases destroyed by the German officers before they left these vessels.

The Marconi Co. also furnished trained radio operators for these vessels, and made efforts to supply the larger needs for radio equipment and radio operators which we foresaw the Shipping Board would have.

But our attempts to carry on this work were promptly blocked by the Navy Department, which contended that it would care for the needs of the Shipping Board.

What plans the Navy Department followed to change the attitude of the Shipping Board, we do not know, but the first result of their program was that the Marconi Co. was instructed not to maintain its own apparatus on vessels requisitioned by the Shipping Board, this work having been assigned to the Navy Department.

The Marconi Co. was, therefore, kept from looking after its own sets installed on merchant ships, but nevertheless we reduced our monthly rental charges by an amount equal to the cost of maintenance and repair.

The next step taken by the Navy Department was to request the Marconi Co. to sell its apparatus outright and to terminate its rental contracts.

The Bureau of Steam Engineering in its letter to the Marconi Co. of May 29, 1918, stated:

The bureau is opposed to the payment of rental for leased radio apparatus at any figure.

Feeling that the Navy Department had not given full consideration to our side of the case, and that its attitude was one of discrimination, I addressed a letter to the Bureau of Steam Engineering on May 6, 1918, which letter perhaps will give to the committee the clearest conception of the points involved, and, therefore, I beg to read the letter referred to:

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA,

May 6, 1918.

Bureau of Steam Engineering, Navy Department, Radio Division, Washington, D. C.

Attention, Lieut. Commander H. P. LeCLAIR.

SIR: With further reference to my letters of April 12 and 25 and subsequent interview in your office, on the subject of the Marconi Co.'s rental contracts covering radio equipment installed on merchant vessels, I beg to submit our further explanations as to the reasons for our present rental rates and the factors which govern them.

The Marconi Co. charges \$1,000 per annum for the rental of its equipment installed on any merchant vessel, and since the entrance of this country into the war, we have deducted from this amount \$60 per annum in respect to any vessels upon which the apparatus is maintained by the Navy Department. Thus the net rental paid to the Marconi Co., at the present time, is \$940 per ship per annum.

As I have indicated in my previous letters and discussions on this subject, it has taken about 15 years to successfully organize and develop the rental business and to bring it to a position where it can be operated on a reasonably profitable basis. All sorts of rates were charged steamship companies by competitors for the rental of apparatus prior to 1914 and the results were unsatisfactory and unprofitable, both to the steamship companies and to the radio organizations which conducted the service. This is especially true in the case of the United Wireless Co. which, prior to 1912, had charged steamship companies a rental of approximately \$7 per annum, and although it operated, at that time, upwards of 400 vessels, the results based on these charges were such as to throw the United Wireless Co. into bankruptcy. Aside from its failure to earn a reasonable profit on its investment, it was also unable to improve its

equipment and to keep the radio apparatus on merchant vessels in a state comparable to the advance of the radio art.

After the Marconi Co. purchased the assets of the United Wireless Co. it dismantled practically all of the apparatus installed on American merchant vessels and installed in place thereof, at its own expense, improved apparatus of the latest design, which is being purchased and used by the Government itself at the present time. This, as you will perceive, was an enormous undertaking on the part of the Marconi Co. which, by reason of its policy of improvement, was obliged to relegate to the junk heap about \$150,000 worth of radio apparatus in order to carry out this policy and to render steamship companies reliable and efficient radio service. It was necessary, indeed imperative, to place the rental business on a solid foundation and to ask steamship companies to make compensation in the form of rental commensurate with the improved apparatus and service.

Our present standard form of agreement was submitted to the majority of American steamship owners about the end of 1915, at which time the rental rates charged were \$1,200 per annum. The steamship companies, at that time, gave full consideration and made a thorough investigation of the subject and, though competition then, as now, was keen and others had offered steamship companies lower rental rates and the privilege of outright purchase of the radio equipment, yet the steamship companies, who are practical business men and recognize the value of service, determined that no proposition was as good as the Marconi rental contract, and accordingly signed our contracts and continued to receive all the advantages of our service. We have received no complaints from any of the steamship companies either against our charges or our service.

Prior to Judge Mayer's decision in the National Electric Signaling Co.'s high-frequency case, the Marconi Co. was obliged to pay the N. E. S. Co. royalty on all its apparatus, rented or sold, and embodying the feature of high-frequency sparks. Although this agreement with the N. E. S. Co. gave the Marconi Co. right under all the N. E. S. Co. patents, yet after Judge Mayer's decision in the high-frequency case, the Marconi Co., at its own risk and expense, terminated this agreement and voluntarily reduced its rental rates to ship owners from \$1,200 to \$1,000 per annum.

When the United States entered the war the Marconi Co. was making satisfactory progress in its rental business, both as regards ships already equipped and those in the course of construction, but the Navy Department advised that it would furnish the equipment on all vessels over 2,500 tons, and while this at once deprived this company of the opportunity to extend its rental business, yet because of the Government's desire, we promptly acquiesced.

Next we were informed that your department desired to own the radio equipments installed on any vessels purchased outright by the Government and that, so far as the Navy Department is concerned, it is opposed to the principle of paying rental. A number of vessel's equipped with our system and under rental contract, were affected by this decision of your department, and, although we were deprived of the benefits which we were justly entitled to receive under the rental contracts then in force and covering the vessels within this class, yet, because of the department's expressed wishes in this matter, we likewise promptly acquiesced in this case and sold to your department the apparatus at extremely low rates and terminated the rental contracts.

Later we were instructed that the Navy Department would maintain the radio apparatus on all vessels controlled by the Government and that the Marconi Co. should reduce its rental by the amount it normally expended on the maintenance of the apparatus on such vessels. This procedure has not been followed by allied Governments, whose vessels continue to be equipped with radio apparatus under rental contracts. Foreign vessels belonging to our allied Governments also come to our shores and transport material and American troops abroad, but the rental contracts covering the radio equipments and service on such vessels continue undisturbed. We were given to understand by your department, that your decision in this respect would not be altered, and while this further weakened our rental organization, yet we bowed to the wishes of your department and not only cooperated to the fullest extent, as you well know, but gave to the Navy Department a number of our skilled men and experts in this line in order that the Navy Department might receive the maximum support and assistance in the execution of its program. You will be interested to know that to date we have furnished the Navy Department with 33 skilled engineers, construction men, and inspectors, and approximately 225 experienced and licensed radio operators.

I might state that since this letter was written a number of additional employees of the Marconi Co. have joined the Government service, and at the time of cessation of hostilities the number of Marconi employees who had entered the Government service were as follows: Engineers and construction men, 35; transoceanic or high-power radio station operators, 26; and radio ship and coastal station operators, 395; making a total of 456 employees.

It now appears that some of the merchant vessels being operated by the Government have been taken over under what is known as a "bare-boat charter," and I understand that in such cases the particular department of the Government having the vessel in charge is obliged to pay the rental for the radio equipment which it uses. In such cases the Navy Department has expressed its opposition to the continuance of the rental contract and has requested us to sell the apparatus outright. The Marconi Co. is unable to comply with the department's wishes in this respect.

Aside from the legal rights which the Marconi Co. has under its rental contracts, which are between this company and the steamship owners and which still continue in force and can not be terminated by either party to the contract until the agreements shall have expired by their terms, we submit that the enforcement of the department's policy in this respect is not to the advantage of either the Government, the steamship companies, or the Marconi Co.

The rental and operation of steamship radio equipments has been the foundation of the Marconi Co., and we attach the highest importance and value to this branch of our organization, which has enabled us to train large forces of radio men and to render to the steamship companies and to the public a successful wireless telegraph service. Compliance with the department's present wishes would mean practically the disintegration of the Marconi Co.'s rental organization and would effectively obviate the possibility of this organization again coming to the assistance of the Government in times of need or national emergency.

Moreover, the merchant vessels which are now being commandeered and requisitioned by the Government will presumably be turned back to their owners after the war for operation in the usual manner and to leave at that time to the individual shipowner the responsibility of properly maintaining and operating the radio equipments in compliance with national and international laws and the procuring of competent radio operators and the successful handling of snip to shore and ship to ship traffic is indeed to leave in the hands of unskilled men the performance of duties which require training and expert knowledge. We have no hesitancy in stating such a condition would approach chaos, and it seems to us unreasonable and unfair to disrupt an institution which has taken so many years to develop and which, if allowed to retain its present activities, will be ready after the war, as it has always been, to properly care for these equipments and personnel and to extend to steamship companies and the general public all the advantages of a competent and successful organization.

For the reasons I have outlined in this and previous letters, we submit that it is not fair to compare the purchase price of a set with the rental rate being charged by the Marconi Co. The purchase price of a set, which is taken as a basis by your department, does not take into consideration development, patent, and organization expenses, and therefore appears low as compared with an annual rental charge. However, these items should not be omitted, for obviously they must be compensated for in some way, and the rental furnishes reasonable compensation. These rates are generally considered just and equitable, and, as I have previously indicated, they have been established under a competitive system between commercial organizations.

The Marconi Co. considers the rental it receives for its wireless equipment in the same way as the telephone company considers the rental it receives for an instrument it installs in a private residence or business office. If the price of a telephone instrument itself is compared with the rental charge made by the telephone company over a period of years, the results would favor the outright purchase of the instrument; but I feel it unnecessary to point out the results which would ensue the individual ownership of each telephone instrument. The telephone company places a value on its service, and so does the Marconi Co.

I might also cite the case of the Pullman Co., which operates a sleeping-car service practically over all railroads in the United States. The Pullman Co. operates its service under a contract agreement with the railroads. The Government has taken over the railroads for the period of the war, and Congress has provided that just compensation be made to the railroads, which, in turn, continue to live up to the terms of their agreement with the Pullman Co.

Presumably the Government does not contend that the Pullman Co. shall receive compensation based on the actual cost of the steel cars and furnishings only, for compensation can only be just when due recognition is given to all the factors of a service organization. It is also presumed that the Government does not require the railroad company to abrogate its contract with the Pullman Co., nor does it require the Pullman Co. to sell outright to the Government its steel cars and furnishings.

In the same way the Marconi Co. furnishes the steamships a wireless service covered by a contract, and, while the Government may itself be operating certain of these vessels, it does not follow that the contracts with the steamship companies in these cases should be terminated and the sets sold outright to the Navy Department, which desires to purchase them at such prices as to eliminate all recognition of service, development, patents, organization, etc.

A further illustration might be cited which would, perhaps, more clearly emphasize our point of view. Take the case of the submarine signaling bells installed on merchant vessels now being operated by the Government under "bare-boat charter." We understand that submarine bells are installed on vessels under a rental contract, and that the instruments remain the property of the Signaling Co. We are informed by steamship companies and the Signal Co. that where vessels equipped with submarine bells have been taken over by the Government under "bare-boat charter," the Government continues to pay the rental for these submarine bells, in accordance with the contract between the steamship company and the Signaling Co. The submarine bells still remain the property of the Signaling Co., and the Government, so far as we know, has not purchased nor attempted to purchase any of these devices installed on "bare-boat chartered" vessels.

We therefore do not understand why the Government should differentiate in its policy between the Marconi Co. and the Submarine Signaling Co., especially since the Marconi Co., in addition to its apparatus, also maintains a reliable service and organization throughout the world.

Summarizing, I wish to say that the Marconi Co. considers its present rental rates as entirely just and equitable and feels that the Navy Department should not oppose, but, on the other hand, should assist this company in the preservation of its organization, not only for its own benefit, but for the benefit of the Government, the shipowners and all others concerned in the operation of radio equipments in maritime service.

I understand that it has been suggested by your department to the Shipping Board and to others, that the equipments on requisitioned vessels be purchased and that the Marconi rental contracts be terminated. We believe that if such suggestions have been made, they have probably been made prior to the consideration of all the facts in the case and, knowing the department's disposition to act fairly in this, as in all other matters, I respectfully urge a reconsideration of this matter. If, in my letters of April 12 and 25 and of this date, I have failed to cover any of the points upon which your department desires further light, I shall be glad to submit any additional particulars that you might request.

Trusting that you will reconsider this matter and reach a favorable decision, I am,

Respectfully, yours,

DAVID SARNOFF,
Commercial Manager.

The Navy Department made no reply to the letter I have just read, but in subsequent communications reiterated and affirmed its opposition to our rental policy, and under date of June 12, 1918, the Bureau of Steam Engineering addressed the Marconi Co. stating that—

the bureau has no other recourse than to adhere, without exception, to its policy and declines to authorize or recommend payment of any bills for rental which may be submitted to the bureau for such radio equipment;

they sending a copy of this letter to the Director of Naval Communications, United States Shipping Board, Quartermaster General, United States Army, and Bureau of Supplies and Accounts.

The matter of radio apparatus and communication being placed in the hands of the Navy Department, the Shipping Board naturally

relied on its judgment as to the best course to follow, and, apparently, the continued persuasion of the Navy Department resulted in instructions issued by the Shipping Board to the Navy Department—and referred to by one of the officers who testified here—requiring them to purchase outright all of the Marconi radio equipment installed on merchant vessels under requisition.

Accordingly the Bureau of Steam Engineering, brushing aside all of our arguments and contentions, addressed a communication to the Marconi Co., under date of June 26, 1918, reading:

GENTLEMEN: The bureau has been authorized to purchase, for account of the Shipping Board, the leased radio equipment on all vessels operated by or under the control of the Shipping Board.

It is requested, therefore, that you furnish quotations covering your leased radio apparatus installed on vessels included in the inclosed list of requisitioned vessels dated June 19, 1918, and also any additional vessels for which you may be billing the United States Shipping Board for the rental of your leased radio equipment.

An early reply is requested.

Very respectfully,

(Signed)

By direction of Chief of Bureau.

From the foregoing it will be obvious to this committee that the Marconi Co. was confronted with the alternative of selling over 300 of its ship sets to the Navy Department, and adjusting itself to the new conditions forced upon it by the Navy Department, or else refuse to sell the apparatus and take legal action against the Government in the Court of Claims, a procedure with which the gentlemen present are no doubt quite familiar.

Not, indeed, from choice, but from absolute necessity, the Marconi Co. decided to yield to the Navy Department and to sell its ship equipment, which at once made necessary the sale of its coastal stations, for, its rental system practically destroyed by the Navy Department, the Marconi Co. had no longer need of its coastal stations. Hence, we submitted to the Navy Department a proposition covering both our ship and coastal stations, and, after negotiations, the sale of 330 ship sets and 45 Marconi coastal stations was effected to the Government at the price of \$1,450,000, and the rental contracts covering these ships terminated.

Having recited these circumstances in full, I leave it to the decision of your committee as to whether or not this sale was a voluntary act on the part of the Marconi Co. However, I think it only fair to say that after the Marconi Co. decided to sell its ship and coastal stations the Navy Department, through its officer in charge of the radio division, Commander S. C. Hooper, who only recently returned to the bureau from sea service, dealt with this subject with the utmost fairness and concluded negotiations equitable and satisfactory both to the Government and to the Marconi Co., and it is a pleasure, gentlemen, for me to testify here to the uniform courtesy and fairness of spirit exhibited by Commander Hooper in his administration of the complicated and difficult matters under his jurisdiction.

Now, with reference to future development of the radio art, the passage of this bill (H. R. 13159) would stifle the development of the radio art. Those testifying on behalf of this bill apprehended that the opponents of the bill would contend that its passage and enactment into law would stifle the growth and development of the radio art, and well were they justified in their apprehension.

We not only contend that such would be the case, but we honestly and firmly believe it to be true. It may be said of us that we are commercial men, and as such our opinion on this subject is perhaps not an impartial one. But, what can be said of the opinion of the technical man and the inventor, who the naval officers ask us to believe would fare better under a Government ownership and naval monopoly of radio communication than he does at present? Why do not these technical men and inventors employed by commercial companies, here described as victims of the present system, come before you and urge the passage of this bill and the creation of a Government monopoly? And, more significant still, what are the views and opinions expressed by independent scientists and inventors, whose long experience in the fields of discovery and invention have qualified them to speak authoritatively on this all-important phase of the question?

Lest the significant words of those belonging in this class, who previously appeared before you, be temporarily overlooked or forgotten, I have taken the liberty of extracting from the records of the hearings held before your committee in 1917 on a similar bill the pertinent statements of the leading scientific witness.

The Hon. Thomas Ewing, United States Commissioner of Patents, being asked by Judge Saunders, of this committee, whether it was not true that Government ownership of radio would limit the possibility of development of the radio art for commercial purposes, said in reply to this highly relevant question:

That is true, and the question I think that Congress is to take into account is where it is going to draw the line. We have a present situation and we have the future possibilities. The present situation is that we have an instrumentality for a communication that is of great importance to the Government and to commerce, and we ought to get the benefit of them. The future possibility is that it may be made very much better. My theory and my objections to the theory of Government ownership are that if the Government takes over the wireless business it will largely be the end of the development of wireless.

Continuing, Mr. Ewing said:

I do not think that the Navy Department or any department of the Government is organized for purposes of investigation and development of the sciences and arts, such as wireless, and that if the Navy Department gets control of it it is not at all probable that the advance will be such as it will be if we can leave the field largely open to private enterprises. * * * As a matter of encouraging scientific investigation the Government is not a shining success in comparison with private enterprises.

These are the words, gentlemen, of a distinguished patent lawyer and the Commissioner of Patents for the United States, who perhaps has been in the best position to judge of the merits of scientific research and invention and the sources of production.

Then considering the testimony of Prof. Pupin, professor of electromechanics of Columbia University, New York, an inventor of international fame and one of the leading mathematicians and scientists of the present age. His statements before this committee are just full of emphasis that, in his judgment, Government ownership of any art, and especially a young and rapidly developing art, such as radio communication, will mean its stagnation and its death. He deals with the subject not only from the material point of view of the inventor who, under Government monopoly, lacks the incentive, but also from the psychological viewpoint, which is that the Government

getting around scientific difficulties by legislation, as is proposed in this case, limits the scope of the art and its practical utility, and thus minimizes, if not entirely obviates, the apparent need for invention and improvement. In other words, the good old slogan "Necessity is the mother of invention" is as true in the radio art as has been in any other art, and if you eliminate the necessity for invention, you are very likely to preclude the possibility of invention.

It should also be recognized that most of the inventions and improvements which have been made by the practical and technical men employed by the various commercial interests concerned with the operation of radio stations. The operation of the stations by private interests has given the various technical employees the opportunity to experiment with and improve upon the apparatus used. Actual operating conditions at the stations and experience with the equipment employed form in most cases the basis upon which new thought, new ideas were founded and which resulted in invention and improvement.

If the Navy Department is given a monopoly over the operation of all radio stations in this country, where will these outside technical experts obtain their further experience and knowledge of actual operating conditions?

I seriously doubt whether the salaries paid by the Government to their technical experts are such as to invite commercial experts to join the ranks of the Government employees. In fact, I have discussed this subject with a number of my friends and acquaintances in the radio art, who have unhesitatingly expressed themselves against employment by the Government in time of peace.

The very greatest incentive to experimenters and technical experts is offered when the field is left commercially free and where incentive is found, there the best work is done and the maximum results obtained.

I wish to say just a few words on the subject of overland radio communication. The proponents of the bill have urged that where other means of rapid communication exist no license shall be granted for the erection and operation of radio stations. Here is a concrete example of the limitations of this bill and the tendency to stifle the growth and development of the radio art.

Telegraph and telephone lines communicate satisfactorily and rapidly when the wires stay on the poles, but sleet and wind storms, and hurricanes, have no respect for wires nor for telegraph poles, and those of you who have lived longer than I have, undoubtedly can recall better than I the countless times when communication by wire from point to point was impossible because the wires were prostrated by storm.

I might say to you that I am a member of the Association of Railway Telegraph Superintendents, to whom communication means everything, and for the past few years, particularly since the installation of the Marconi System on the Lackawanna Railroad, these railway superintendents have studied and discussed thoroughly the possibilities of radio as an auxiliary means of communication when no other means are possible. Several years ago, during a raging winter storm, practically all of the telegraph lines in the East were temporarily put out of commission, and railroad passenger and freight traffic was seriously delayed. The Lackawanna Railroad Co.,

by means of maintaining a radio station at Binghamton and Scranton, N. Y., and at Hoboken, N. J., was able to maintain continuous communication by radio, and I have been informed by the superintendent of telegraphs of that road that because of this fact, the Lackawanna Railroad Co. was able to resume the operation of its trains earlier than any other railroad company in the East. This single instance of wireless communication, he said, saved the Lackawanna Railroad Co. \$150,000. Under the provisions of this bill I believe that the possibilities of the railroad companies adopting a radio system for communication are remote and quite improbable, if not entirely impossible.

And what shall we say about the future of the wireless telephone, which is rapidly coming to the front, and to which the world has given great impetus. Leave the commercial expansion of the radio art unhampered and I am confident that it is only a matter of a few years when we shall have transcontinental radio telephony. That this is scientifically possible has already been demonstrated; it but remains for technical experts to perfect existing wireless telephone apparatus, and for private enterprise to erect high-power radio telephone stations to effectively compete with telephone lines and materially reduce telephone tolls. It could not help but reduce the rates, because a radio telephone station located in New York and another in San Francisco, capable of continuous transcontinental communication, will be possible of erection at an investment of approximately \$1,000,000, and this investment is small, indeed, compared with the investment which the users tie up when talking over a long-distance wire telephone circuit strung between New York and San Francisco, which investment, I should say, roughly, represents \$20,000,000.

And now I have come to the keynote of all that has been thus far said before your committee in behalf of the bill—namely, the so-called interference problem.

The leading exponent of this Government ownership bill now under discussion, the honorable Secretary of the Navy, who has appeared and testified before you, was questioned by Congressman Humphreys, one of the members of this committee, as to the compelling reasons why the Navy Department must have an exclusive monopoly of the radio business, and in my judgment these questions and the Secretary's answers constitute the substance and the meat of this entire proposition, and the particular passages in the testimony to which I refer are the following:

Question by Mr. HUMPHREYS. Is the reason at these privately owned and operated stations interfere with each other and with the Navy the sole reason why the department wants to control the radio system? Is there any other reason of policy or otherwise why the department wants to take over the radio business?

Answer by Secretary DANIELS. There are only two methods of operating the wireless, either by the Government or for it to license one corporation. There is no other safe or possible method of operating the wireless.

Mr. HUMPHREYS. That is because of the interference in the other, is it?

Secretary DANIELS. There is a certain amount of ether and you can not divide it up among the people as they choose to use it. One hand must control it.

Mr. HUMPHREYS. And that is the sole reason that actuates the department, is it?

Secretary DANIELS. That is the sole reason.

Mr. HUMPHREYS. There is no other reason of policy that actuates the department?

Secretary DANIELS. That is the sole reason—that one hand must operate and control it.

Gentlemen, you have heard these questions and answers, and since interference is claimed by the Secretary of the Navy to be the sole reason for this bill I trust you will bear with me while I analyze this prime cause for our presence here.

Let me admit at the outset that interference in wireless communication does exist, and that it is more or less of a problem, and that while many improvements and advancements have been made toward the elimination of this troublesome factor in radio communication it is nevertheless a fact that the problem is yet to be completely solved; but the all-important question is, Does the bill sponsored by the Navy Department solve the problem, and does it do so in a scientific and practical way? My opinion is that the bill does not accomplish this purpose. You can not legislate interference out of existence. True, you may temporarily minimize interference and the difficulties experienced therefrom—that is, you may decrease the present difficulties of operation and make the life of the radio operator easier—but at what cost to the art, and at what cost to the public, and last, but not least, to the Government itself?

The fact that the Navy Department admits that there is no way in which to solve the interference problem except by legislation bears the most eloquent testimony to its poverty in scientific perception and its lack of faith in human genius to overcome this problem. In my judgment and in the judgment of men whose scientific opinions are infinitely more valuable than mine, the problem of static interference—which interference Prof. Pupin so aptly termed an “act of God”—was a far more serious and more puzzling and less hopeful problem to solve than that of wave-length interference—“the act of man.”

In discussing the static problem with radio men I have in the years gone by been told by some of the leading scientific experts that in their opinion the static problem was unsolvable and that there was no way to overcome it, and yet this baffling problem, an obstacle to continuous radio communication over long distances, has been solved, and solved by an American in civilian life, who has never been connected with the Navy Department or any other Government agency.

Only yesterday I discussed anew with the inventor of the static preventer the question of interference and asked his opinion in the matter. He unhesitatingly replied that he felt confident of the complete solution of the interference problem, and, what is more, he stated that right now, every day, definite and important progress is being made and that the complete solution of what is left of the interference problem is almost in sight.

If the members of this committee can find an opportunity to refer to the records of the last hearing, held in this room on a similar bill, when the matter of interference was discussed, they will find that what I have said and quoted is confirmed by the opinions expressed by such scientific geniuses and men skilled in the radio art as Prof. Pupin, of Columbia University; Prof. Kennelly, of Harvard University; and Prof. Goldsmith, of the College of the City of New York.

As against the opinions of these leading scientific minds, let me ask which of the proponents of this bill who have thus far appeared before your committee are willing to take issue with these men and their opinions, and to state as a scientific conclusion that the interference problem is unsolvable? And, further, that there is no other way to meet the emergency except by legislating interference out of existence, which, perforce, means limiting the number of stations operating at the same time and consequently limiting the number of messages which can be sent and received at the same time. This would place an artificial barrier on the expansion and development of a public utility, which bids fair, under commercial operation, not only to rival but to surpass every other means of intelligence transmission. If such there be among the proponents of this bill, let me say for his information that interference has not singled out radio communication for its sole attack. Mr. Interference has simply come to life again, and is at present in the air but locking down upon the Navy Department, which seems to include the only people fearing his power and who have complained to Congress, seeking his destruction and annihilation through this present bill.

Our old friend "interference" seems to have a particular dislike for those who wish to communicate, and a study of this scientific subject will illustrate that in the early days of land wire telegraphy and telephony they experienced exactly the same trouble from inductive disturbances on the telegraph lines, and cross-talk on the telephone lines. These disturbances were produced in a wire by the operation of neighboring wires. Now, if at that time legislation similar to that now being sought by the Navy Department had been enacted, prohibiting the stringing of telegraph and telephone wires on the same poles and compelling duplicate sets of poles and lines, separated miles apart, would the present high state of perfection of the telegraph and telephone systems have been reached? I think not. What happened instead? The scientific minds struggled with the problem until they solved it, and interference from neighboring wires is no longer a problem, and as many wires can be strung on a pole line as the poles will hold, and they can be placed almost as near together as you please. This, of course, means a tremendous saving in the expense of installation and operation of telegraph and telephone lines.

The honorable Secretary has stated that "there is a certain amount of ether, and you can not divide it up among the people as they choose to use it; one hand must control it." Now, the ether knows no national boundaries, or 3-mile limits; it is a common and international medium, and therefore it is not possible for one hand to control it. It is not the American people, and not the American stations which our Government will have difficulty in controlling, because it has the power of the present regulations, and the ability to obtain more regulation if this, in the judgment of Congress, seems necessary. It is the foreign stations that may cause the greatest amount of interference, and we have no means of controlling them except by international agreement, and if we can get along harmoniously with all of our neighbors in the rest of the world by living up to international agreements, why it is impossible or impracticable for the Navy Department to get along amicably, and to work harmoniously with its friends on American soil? One hand, to use the Secretary's phrase, may control all the high-power stations in the

United States, but that will not prevent interference from such stations as may be erected in Canada, or in Cuba, or in Mexico, or in any other South American country.

Gentlemen, it must be evident to you that this question of interference, which, it has been stated, is the sole reason for this bill, is really not a reason—it is an excuse for obtaining Government ownership and Government monopoly of all radio communication in this country. Our friends the English, who have had experience in Government ownership and Government operation of telegraph and telephone lines, do not seem to fear the increasing number of high-power stations, and are making extensive arrangements for some long-distance stations, and it is significant, too, that the British Government, while operating telegraph and telephone lines, has not, so far as we know, launched on a policy of Government ownership of high-power radio stations.

The CHAIRMAN. During this war who operated the high-power stations in England?

Mr. SARNOFF. The British Government.

The CHAIRMAN. And in France?

Mr. SARNOFF. The French Government.

The CHAIRMAN. And in Italy?

Mr. SARNOFF. I believe the Italian Government.

The CHAIRMAN. The Government took over and operated them during the period of the war?

Mr. SARNOFF. Yes, sir.

Mr. EDMONDS. I think it was testified this morning that the Canadian Government returned what they had taken 10 days ago.

Mr. GREENE. Have any of the governments across the water returned what they took over?

Mr. SARNOFF. The only return of radio stations, so far as we know at present, has been by the Canadian Government.

It has been stated to you that only seven countries at present favor or permit private ownership of radio stations, but it has not been stated that these seven countries are the only countries which have helped to develop wireless communication, and, therefore, the proponents of this bill have not claimed that ship-to-shore radio communication would be interfered with by the working of high-power radio stations, and I merely wish to emphasize this important fact that private operation of commercial high-power international radio stations has nothing whatever to do with the interference problem—so far as this problem applies to ship and shore work.

So far as the interference which may be caused by the operation of high-power stations is concerned, this matter comes under two distinct heads: First, the interference which may result between commercial stations operated by different private companies; and, second, the interference of these latter stations with such stations as the Navy may have operating in this field.

As to the first item we fail to see why the Navy Department should concern itself over the troubles which they apprehend may develop between rival private interests, since this is a matter which these private interests should settle amongst themselves; and in the extreme case that additional legislation should be required, it should be for these interests themselves to appeal to Congress for such legislation.

Another item of even greater importance is the fact that as matters stand to-day the only commercial high-power stations controlled by private interests—with the exception of Tuckerton—are owned by the Marconi Co., and such problems as may develop due to the entrance of other parties into this field will be problems of the future and not of the present.

Concerning the second item, namely, interference with Navy stations, let us first consider which high-power stations the Navy has, and, next, what possible use they may have for them. I may say that at present there are two stations on the Atlantic coast, Sayville and Annapolis, owned by the Navy which can be properly termed high-power stations. For what possible purpose can the Navy require these stations other than to work with their ships at sea; certainly the private companies can take care of all transoceanic commercial communication. If the only need for naval high-power stations is to work with the naval ships, then these high-power naval stations will be necessary only in case the naval vessels are at very great distances from the United States as otherwise the naval coastal stations can take care of them.

I think you will agree, gentlemen, that the fleet of the United States is found at great distances from its own shores only on occasions which occur so rarely as to be almost negligible in times of peace. We do not keep our Navy in England, or France, or Japan, but we keep it in or near our own ports except in time of war. From this, I think it will be obvious to you that the amount of long-distance radio communication for the Navy is so small that the question of its being interfered with by commercial operation is of no consequence.

Summarizing my remarks on this interference question, I wish to say that I am of the firm opinion that intelligent regulation, and enforcement of these regulations, will provide all of the technical benefits sought by the Navy Department under this bill, and will, at the same time, obviate the very serious perils which confront the radio art if the Navy Department is given the sole and exclusive monopoly of all radio communication, and private interests are destroyed.

MR. BANKHEAD. I have been very much interested in the last few days in the announcement that the telephone had been perfected to such an extent that numerous messages can be conveyed over the same wire. You were talking about the possibilities of additional inventions and discoveries. Have you contemplated the possibilities of the same wave lengths for the conducting of more than one message, simultaneously, in the future?

MR. SARNOFF. At the present time it is not possible, but I would not say it would be impossible in the future. The wireless stations have already surpassed in invention and improvement all other methods of communication. For example, it is possible to send at a very high rate of speed at radio stations, in some cases up to 200 or 300 words per minute, while the cables, which have been in existence for over 50 years still send at a very low rate of speed, about 40 words a minute.

THE CHAIRMAN. You mentioned an invention of an instrument to prevent static interference, but I do not believe you gave the name of the man who invented it?

Mr. SARNOFF. The gentleman I referred to is Mr. Roy A. Weagant, the chief engineer of the Marconi Co.

The CHAIRMAN. Has it been tested out so that you can tell whether it is a success?

Mr. SARNOFF. Yes, sir; it has been tested, and has been in operation for the past two years.

The CHAIRMAN. As I recall, when we had the hearings on the radio act of 1912 there was another company, the National Electric Signaling Co. of Pittsburgh, or some of their inventors, who were about to perfect an instrument to prevent ordinary interference. What progress was ever made along that line?

Mr. SARNOFF. As far as I know, that instrument is not on the market.

The CHAIRMAN. It has not been perfected yet?

Mr. SARNOFF. I do not know of it.

The CHAIRMAN. If an instrument like that could be perfected, that would go a long way toward solving all of these difficulties, would it not?

Mr. SARNOFF. Yes, sir; and I believe in time such perfection and improvements will be made.

The CHAIRMAN. No progress has yet been made, so far as you happen to know?

Mr. SARNOFF. There has been considerable progress made in minimizing a great deal of the interference which existed three or four years ago. We are making definite progress every day, but the problem has not yet been completely solved.

The CHAIRMAN. To what extent has that been done?

Mr. SARNOFF. I do not know that I could answer that question in terms of percentages, but I believe at the present time it is possible to operate a number of high-power radio stations with a variation of wave length of from 1 to 2 per cent, whereas three or four years ago this was not possible. There has been improvement not only in the transmitting apparatus but likewise in the receiving apparatus. It has been made much more selective. Also the installation of antennas with respect to the stations with which they are required to work is a matter upon which much improvement has been made. It is now possible to receive from a desired direction much better than from the direction not desired.

Mr. WHITE. One of the Navy witnesses stated that they used a 600-meter wave in this ship-to-shore and shore-to-ship service, and I asked him if there could not be reserved a limit of wave length for the use of that particular service, and if private enterprise could not be allowed to operate outside of those limits either above or below without any interference with this particular ship-to-shore service. What do you say as to that?

Mr. SARNOFF. Under the act of 1912 commercial ship-to-shore stations are obliged to tune their apparatus to standard wave lengths of 600 meters and 300 meters. They may use any wave lengths below 600, and they may also use any wave length above 1,800, and the range between 600 and 1,600 is reserved for Government use.

The commercial people have not complained about their limitations, but the Government, which has an unrestricted range of wave lengths, does complain.

Mr. WHITE. That is what I wanted to get at. Why can they not, between those limits of 600 and 1,800 meter wave lengths, carry on this ship-to-shore service and leave the balance of the field for commercial purposes? Why can not that be done?

Mr. SARNOFF. For a medium distance of, say, 400 or 500 miles, I believe the Navy can conduct all the communications necessary with its naval ships and coastal stations by sticking to that range of wave lengths. When it decides to go farther and long-distance communication is attempted, different apparatus is employed, and with respect to such apparatus the use of longer waves, above 1,800 meters, has been found to be more efficient.

Mr. HUMPHREYS. You spoke of renting these instruments for \$1,000 to the ships. That is an annual charge, is it not?

Mr. SARNOFF. Yes, sir.

Mr. HUMPHREYS. When one ship communicates with another there is no charge; nobody is charged for that?

Mr. SARNOFF. The shipowner is not charged.

Mr. HUMPHREYS. Suppose the shipowner wants to communicate with his New York office?

Mr. SARNOFF. Under our rental contracts we provided for a certain amount of communication which was incorporated in this charge of \$1,000. To be specific, we allowed a shipowner 6,000 words per ship per annum, which figure was found to be more than the average shipowner would use in that time.

Mr. HUMPHREYS. Above that he would pay—

Mr. SARNOFF (interposing). The regular coastal charges.

Mr. HUMPHREYS. So that this \$1,000 rental charge for the apparatus included a certain amount of service free?

Mr. SARNOFF. Yes, sir; it included all the service the shipowner required, because I do not believe there has been a case where a shipowner has paid the Marconi Co. tolls on any messages sent between his office and his ship on his business.

The CHAIRMAN. In reference to the rental of \$1,000 per annum for the installation and use of the apparatus on the ship, does that include the service of an operator.

Mr. SARNOFF. No, sir; we made a separate charge for that.

The CHAIRMAN. That was paid by the shipowner?

Mr. SARNOFF. That was paid by the shipowner. I would like to say further in answer to Mr. Humphrey's question, that this service of the Marconi Co., rendered to shipowners under rental contract, providing for 6,000 words per ship per annum, means \$360 per ship per annum, on the basis of the present rates charged, namely, 6 cents a word, by the Navy Department or the Marconi Co., so that the shipowner who will now privately operate his set will pay to the Navy for 6,000 words per annum \$360, and the inference has been conveyed here by some that the charge of \$1,000 was excessive.

Mr. BANKHEAD. You said there was an additional charge for the wages or salary of the wireless operator. Under the contract was the shipowner allowed to furnish his own operator, or required to use the services of an operator furnished by your company?

Mr. SARNOFF. We furnished the operators and the shipowner could pay the wages direct, if he saw fit to do so.

Mr. BANKHEAD. He had to take the operator you furnished?

Mr. SARNOFF. He had to take the Marconi operator we furnished, because in that way we took the responsibility for the service on that ship. If we installed the instrument and had no control over the operator we could not guarantee the service.

Mr. HUMPHREYS. Who paid for the maintenance and upkeep of the set which the ship had?

Mr. SARNOFF. The Marconi Co. maintained the apparatus. It did that at its own expense, and also kept the apparatus up to date and installed all the latest improvements at its own expense.

The CHAIRMAN. The shipowner first paid \$1,200 a year, and that was then reduced to \$1,000. The shipowner paid that sum, plus the cost of the hire of the operator and the cost of his maintenance on shipboard, did he not?

Mr. SARNOFF. Yes, sir.

The CHAIRMAN. You are responsible for the maintenance of the apparatus at your own expense?

Mr. SARNOFF. For the maintenance of the apparatus on shipboard, and also the maintenance of the coastal stations, and we also paid the operators at the coastal stations.

The CHAIRMAN. In addition to the protection to his ships and passengers by the installation of this apparatus, the shipowner had the benefit of 6,000 words per annum, amounting to \$360 per annum?

Mr. SARNOFF. Yes, sir.

Mr. BANKHEAD. After the Navy took over the wireless stations, did they furnish the operators or were they so furnished by your company, or recommended by your company?

Mr. SARNOFF. In the case of vessels which carried guns and an armed guard the Marconi men were replaced by naval men, or else the Marconi men were taken over by the Navy. In other cases the Marconi men remained.

Mr. BANKHEAD. Was there any difference in the wages paid by the Marconi Co. and those paid by the Navy for men of the same class?

Mr. SARNOFF. There have been some cases where the compensation paid by the Navy Department was less than that paid by the Marconi Co. I do not know definitely the rates of pay maintained by the department, but the Marconi rates commence at \$40 a month, with a \$10 a month increase every six months until a maximum salary of \$80 a month is reached. I believe this maximum salary is in excess of the amount paid by the Navy Department.

Mr. HARDY. Let me ask you about the free service that went with the rental contract. That was at the time when the Marconi Co. owned the shore stations?

Mr. SARNOFF. Yes, sir.

Mr. HARDY. That contemplated 6,000 words to be exchanged between the ships and the Marconi shore stations?

Mr. SARNOFF. Yes, sir.

Mr. HARDY. Did that give any right to have communication with the naval shore stations?

Mr. SARNOFF. The naval shore stations were not required to carry on commercial communications with ships.

Mr. HARDY. Suppose one of these naval vessels which had upon it one of your instruments rented for \$1,000 a year wanted to communicate with a naval shore station. Did you take out of that \$1,000 the payment for that service?

Mr. SARNOFF. There have been no cases, so far as I know, where a vessel equipped with Marconi apparatus operating under a rental contract was obliged to use the Navy coast stations and transmit these service messages, included in the 6,000 words.

Mr. HARDY. What occurred to me was this: When the Navy took over your instruments, or required you to sell them, or agreed to buy them, at that time they owned all the ship-to-shore stations, did they not?

Mr. SARNOFF. No, sir; they owned the naval stations, and they took over and operated the Marconi coastal stations.

Mr. HARDY. They were operating them at naval expense?

Mr. SARNOFF. Yes, sir.

Mr. HARDY. That annual charge of \$1,000, allowing the sending of 6,000 words, is the expense of receiving it at the shore station, is it not?

Mr. SARNOFF. In the cases where the naval stations, or the Marconi coastal stations under Navy control, conducted commercial communications with ships equipped with Marconi apparatus, the Marconi Co. paid the Navy Department 6 cents per word for every message sent between the shipowner and the master of the ship out of this \$1,000.

Mr. HARDY. As I understand this figure, the Navy Department had taken over these coastal stations, and after the Navy Department had taken over those stations you have been deducting from this \$1,000 the amount that the messages sent would amount to at 6 cents a word?

Mr. SARNOFF. We paid the Navy Department for any messages sent by the ship companies or ships equipped with our apparatus.

Mr. HARDY. At the rate of 6 cents a word?

Mr. SARNOFF. At the rate of 6 cents a word.

Mr. HARDY. That reduced the rental?

Mr. SARNOFF. That reduced the rental by that amount.

Mr. HUMPHREYS. I would like to ask a question, please. You say they took over the Marconi stations for the period of the war. Has the Navy Department absolutely acquired the title to the shore stations?

Mr. SARNOFF. Yes, sir; it now has acquired the title to those shore stations.

The CHAIRMAN. Under the act of 1912 during the period of the war or probable emergency the Government has the right to take over the stations.

Mr. SARNOFF. Yes, sir; and we voluntarily offered them.

Mr. HUMPHREYS. Yes; but you do not get my question. Is that only for the period of the war?

Mr. SARNOFF. Well, the stations were originally taken over under the provisions of the act of 1912, ostensibly for purposes of the war, but owing to the conditions which I have recited at length, we sold these coastal stations and they are now the property of the Government.

Mr. HUMPHREYS. What is the life of a set of Marconi instruments, the ship set?

Mr. SARNOFF. The life of a wireless set itself can be fairly stated as 10 years, but the radio art progresses by such leaps and bounds

that nobody would think of using a set to-day that was used 10 years ago; at least, not without improvements.

Mr. HUMPHREYS. Then, what would you say is the probable practical life of a set?

Mr. SARNOFF. I would say about five years. I think the evolution of wireless has a sort of five-year demarkation point, if I may so term it; every five years a new type of equipment comes in.

Mr. HUMPHREYS. About what is the annual cost of upkeep and maintenance? Do you know, approximately?

Mr. SARNOFF. The cost of inspection and maintenance itself was approximately figured at \$5 per month per ship, or \$60 a year, where over 500 vessels were maintained; and naturally it depends upon the number of vessels that you maintain. But this figure does not take into account the question of obsolescence or improvement or major repairs.

Mr. HUMPHREYS. The obsolescence was taken care of in that first question I asked you. I do not know just what you mean by the major repairs. If you have sets on the 500 ships, about what would you figure it would cost you to keep those up per year?

Mr. SARNOFF. Roughly \$60 a ship per year.

Mr. HUMPHREYS. That would cover major repairs and all, about \$60 a year? And what was the cost of those sets? What would it cost you to put a set on a boat, to buy it and install it?

Mr. SARNOFF. The same sets that we have installed on ships under the rental contract of \$1,000 a year were sold commercially for \$3,300 per set. And right at this point, if I may be permitted to carry out your thought, if you take the figure of \$3,300 and allow even 10 per cent for depreciation, and then the interest on the investment and the cost of maintenance and repair and inspection of that set, and the cost of all these messages that are provided for under the rental contract, and the cost of improvements that may be made, and the possible damage that the shipowner may sustain by reason of the operator violating the rules and regulations specified in the act of 1912, and a number of other matters, such as maintaining the accounts of messages handled on shipboard, providing supplies, furnishing operators, changing them, and countless other details which I could go on and mention, I think you gentlemen will find that \$1,000 a year is not an exorbitant price to charge for all the service rendered under our rental contract.

Mr. HUMPHREYS. This price of \$60 a year did not take into account at all any part of the maintenance of the shore stations, which was, of course, necessary in order to operate?

Mr. SARNOFF. That is right; it did not. The Marconi Co., in addition to maintaining the ships, was obliged to maintain these coast stations at its own expense and operate them.

Mr. HUMPHREYS. Let me ask you one other question. You send 6,000 words free from the ship to the shore. Now, was it then the duty of the Marconi Co. to transmit those 6,000 words to the office of the ship, or was there some charge for that?

Mr. SARNOFF. The radio message which originates on shipboard is sent to a coastal station, and from the coastal station it is sent over the wires of the Western Union Telegraph Co. or the Postal, as the case may be, and the shipowner must, of course, pay the land-wire telegraph company.

Mr. HUMPHREYS. That is delivered by the Marconi Co., though, to the telegraph company without charge?

Mr. SARNOFF. Yes, sir.

The CHAIRMAN. At 6 cents a word?

Mr. HUMPHREYS. No; no charge at all.

Mr. SARNOFF. No charge at all. The land telegraph charge is made by the Western Union or the Postal and the shipowner pays it.

Mr. HUMPHREYS. And the rate of 6 cents a word did not apply until 6,000 words had been received?

Mr. BESHILIN. I understood one of your objections to the proposition for Government ownership and control to be that it would have a tendency not to develop the art. Assuming that a private company had a monopoly of the business, would it have the same effect; and if not, why?

Mr. SARNOFF. No, sir; it is not my opinion that this would be the case where a private monopoly existed. I do not know that I can improve on the ideas expressed by Mr. Nally on this very subject this morning.

The CHAIRMAN. The question was very thoroughly gone into this morning.

Mr. BESHILIN. I was not here then.

Mr. HUMPHREYS. I have just been figuring here. You estimate the service at \$360 a year?

Mr. SARNOFF. Yes, sir.

Mr. HUMPHREYS. And the upkeep at \$60 a year?

Mr. SARNOFF. Yes, sir.

Mr. HUMPHREYS. That would be \$420, so that \$580 is what you would be getting from the ship?

Mr. SARNOFF. Well, we figure a little differently, because we do not figure that the \$360 costs us 6 cents a word.

Mr. HUMPHREYS. I understand that; but if you had rented the machine out and also had the understanding that they would pay whatever they sent, it would cost them \$360?

Mr. SARNOFF. Exactly; that is so.

Mr. HUMPHREYS. That would be \$580. In five years you would receive \$2,900 on a machine that cost you \$3,300, the average life of which is five years.

The CHAIRMAN. The machine cost them \$2,000, as I understand it.

Mr. HUMPHREYS. Three thousand three hundred dollars, he said.

Mr. SARNOFF. I said that was the market price of the machine.

Mr. HUMPHREYS. Well, that is a fair price, I assume.

Mr. HARDY. I thought that you did not sell any of these machines, that you just rented them.

Mr. SARNOFF. We have sold them to the Government.

Mr. HARDY. That is, prior to that?

Mr. SARNOFF. Why, yes; we always sold apparatus to the United States Government, the Navy Department, or War Department, regardless of our rental system. We also sold apparatus to foreign ships when the foreign shipowners wanted them.

Mr. HUMPHREYS. According to your figures you lost money on that operation. [Laughter.]

Mr. SARNOFF. I do not think we did, but I do not think we made as much as we should have made. I am frank to say we did not lose. *You see we charge \$1,000 a year and operate 500 ships and manufac-*

ture the apparatus in large quantities and maintain our own service, and, in addition, use those coastal stations for the transmission of private messages for which we are paid tolls—passenger traffic.

Mr. HUMPHREYS. I do not mean, of course, that the company actually lost money on this deal.

Mr. HARDY. They did not use the 6,000 words.

Mr. EDMONDS. There was a considerable amount of business you got from the ships?

Mr. SARNOFF. Yes, sir; there was considerable passenger traffic.

Mr. HUMPHREYS. They certainly were not making very much money; they were not making any unreasonable amount of money out of ships that only paid \$1,000 a year. That is very clear from these figures.

Mr. SARNOFF. I will tell you. Mr. Humphreys, what we made. There has been so much speculation about it. In 1916 the Marconi Co. earned from all its ship and shore operations \$100,000 and it operated 500 ships.

Mr. EDMONDS. Mr. Sarnoff, you are going to put a financial statement of your company in the testimony, are you not?

Mr. SARNOFF. Yes, sir.

Mr. EDMONDS. I would like to see in that anyway, as far as you have gone, the number of employees you have. The other day the secretary gave us the estimate that it would cost us about \$5,000,000 to buy these high-power stations. I would like to have your estimate on that.

Mr. SARNOFF. Well, I will leave that matter for Gov. Griggs to deal with. Gov. Griggs will follow me.

Mr. EDMONDS. The reason I am asking the question is this: In this testimony before us about a year ago the Navy Department estimated the coast stations would cost us \$400,000. They appear to have paid \$3,000,000 for them. I just wondered whether their estimate of \$5,000,000 was as good as that.

Mr. SARNOFF. I believe the Secretary was either misinformed or mistaken about the \$5,000,000.

Mr. EDMONDS. I would like, if you will, to go a little further into the Pan American Wireless Co. I believe you are vice president of the Pan American Wireless Co. Tell us, please, your intentions and what your ideas were.

Mr. SARNOFF. That, too, Mr. Edmonds, was covered very fully this morning by our president, Mr. Nally.

Mr. EDMONDS. Oh, I did not hear that.

Mr. BANKHEAD. What is the capital stock of the Marconi Co.?

Mr. SARNOFF. \$10,000,000.

Mr. BANKHEAD. And you made \$100,000 in 1916?

Mr. SARNOFF. On ship-to-shore business; that dealt only with those ship-and-shore rental contracts.

Mr. WHITE. Is that the company in which you have 200,000 stockholders?

Mr. SARNOFF. Yes, sir.

The CHAIRMAN. I have in my files the contract between the Marconi Wireless Telegraph Co., formerly known as the Wireless Telegraph & Signal Co. of London England, and the Marconi Wireless Telegraph Co. of America, incorporated and organized under the

laws of the State of New Jersey, dated April 18, 1902. Have you any existing contracts between your company and the English company showing the relation between the two?

Mr. SARNOFF. I believe the contract you refer to, Mr. Chairman, is the only contract covering the relationship between these companies.

The CHAIRMAN. I have never put it in the record; I never felt I was at liberty to do so. I simply wanted to call it to the attention of the committee, so that if they want to read it they may.

Mr. HUMPHREYS. There is one other question I should like to ask about this ship-to-shore business. A passenger on a ship wants to send a message to somebody on shore. Does the ship company participate in the distribution of that fee, whatever it is?

Mr. SARNOFF. No, sir.

Mr. HUMPHREYS. You get all of that?

Mr. SARNOFF. Yes, sir.

Mr. HUMPHREYS. The Marconi Co. gets it all?

Mr. SARNOFF. Yes, sir.

Mr. BURROUGHS. Let me ask you a question or two, if I may. I understood you in your testimony to say that you knew of no reason from a technical or scientific point of view why this matter of interference could not be taken care of as well by regulation as in any other way?

Mr. SARNOFF. Yes, sir.

Mr. BURROUGHS. Is that correct?

Mr. SARNOFF. That is correct; yes, sir.

Mr. BURROUGHS. Now, you have been doing it, or trying to do it, by regulation, have you not?

Mr. SARNOFF. Yes, sir.

Mr. BURROUGHS. Are you in a position to state, or would you care to state, to the committee wherein you think or for what reason you think that particular form of regulation which they have used has failed, or why it has failed—or perhaps you do not think it has failed?

Mr. SARNOFF. Why, I believe the act of 1912 was a very far-sighted document. I believe that since then the art has developed, and it would be sensible to modify it in some degree and to add such additional provisions and regulations as may seem necessary, but I certainly do not consider that the act of 1912 was a failure. On the other hand, I consider it has been a marked success.

Mr. BURROUGHS. You think the form of regulation which has been in use, then, has been particularly successful?

Mr. SARNOFF. I do; yes, sir.

Mr. BOWERS. And beneficial?

Mr. SARNOFF. Yes, sir.

Mr. BURROUGHS. What, if any, specific suggestions would you make as to any changes in the form of regulation that has been in use?

Mr. SARNOFF. I have no better suggestion to make than the one made by Mr. Nally, namely, the appointment of a national radio commission to study and investigate this subject. The commission should take everything into account and not merely the viewpoint of the commercial people or the viewpoint of the Navy Department. It ought to represent all interested parties, and together they should *make such recommendations as seem necessary.*

Mr. BURROUGHS. I understood Mr. Nally this morning to recommend that the ship-to-shore business, since it was a natural monopoly, be controlled by the Government; that the stations should be owned and the communications controlled entirely by the Government. Would that be your opinion?

Mr. SARNOFF. Yes, sir; it is my opinion; and I heartily indorse Mr. Nally's recommendation. I believe that as to this particular point it is only justice to the Navy Department, which has acquired these stations, because under the act of 1912 a naval station is not permitted to handle commercial traffic with ships at sea when a commercial station exists within 100 miles of the naval station. Obviously if that part of the law is not amended it would mean that the Navy Department would not be free to utilize some of the coastal stations they purchased from the Marconi Co.

Mr. BURROUGHS. Then your recommendation that that be a Government business is based wholly upon the fact that they have the advantage of the situation by having purchased these stations?

Mr. SARNOFF. Exactly.

Mr. BURROUGHS. And for no other reason?

Mr. SARNOFF. Correct.

Mr. BURROUGHS. That is, if they had not purchased the stations, you would see no particular reason for advocating such a policy?

Mr. SARNOFF. I would not then; no, sir.

The CHAIRMAN. The fact is that under dual control the service would not be efficient, whether it was governmental or private?

Mr. SARNOFF. My idea is that it could be made efficient with intelligent regulation and improvement in the art.

Mr. BURROUGHS. I am talking about the ship-to-shore business; that is what I mean.

Mr. SARNOFF. Yes, sir. Of course, I want to say that this interference exists to the very largest degree in the ship-to-shore end of radio communication. Here most of the trouble exists, because so many ships are trying to work at about the same wave length.

Mr. BURROUGHS. Would the fact that human life is perhaps more largely at stake in that branch of communication have any influence on your advocacy of the doctrine that the Government should control that particular branch?

Mr. SARNOFF. Still considering that the Government now has the situation under control and owns practically all these coastal stations, I say they ought to be allowed to operate all of them; otherwise, I certainly do not consider that the Navy Department, through its operation of coastal stations, is better able to preserve life or to make sea travel safer than the private companies have been able to do.

Mr. BURROUGHS. But it is also a question whether they would be able to do it better than by having two concerns—the Government and the outside companies also.

Mr. SARNOFF. If the Government were restricted to the operation of Government business only and such business as it was necessary for them to transact by wireless between these stations and the commercial companies left entirely free to handle commercial business with the ships at sea, then I certainly should not foresee any danger to life because of this dual operation of coastal stations, provided further, that the Navy Department operated on those wave lengths which were reserved for it.

The CHAIRMAN. What other private company was in competition with you in the ship-to-shore service before the war began?

Mr. SARNOFF. There was the Kilbourne & Clark Manufacturing Co. on the Pacific coast; the Wireless Specialty Apparatus Co. in Boston, the Federal Telegraph Co.—

The CHAIRMAN (interposing). How many ship-to-shore stations did the first company named control?

Mr. SARNOFF. The Kilbourne & Clark Co. had no coast stations. They simply sold apparatus to ships. The Federal Telegraph Co. maintained coastal stations on the Pacific coast. The National Electric Signaling Co.—

The CHAIRMAN (interposing). How many sets did it maintain on shipboard?

Mr. SARNOFF. I believe that the Federal Co. maintained about 20 to 25 sets on merchant ships.

The CHAIRMAN. A negligible number?

Mr. SARNOFF. Seventeen, I am told by Mr. Nally.

Mr. EDMONDS. How many coastal stations?

Mr. SARNOFF. Two, I believe.

The CHAIRMAN. What other companies maintained sets on shipboard?

Mr. SARNOFF. There is the National Electric Signaling Co., which maintained some sets on shipboard and also maintained two or three coastal stations.

The CHAIRMAN. How many sets did they have on shipboard?

Mr. SARNOFF. I believe about a dozen.

The CHAIRMAN. All told, about 20 sets were maintained on shipboard aside from those maintained by your company?

Mr. SARNOFF. There was in addition the Kilbourne & Clark Co., which maintained about 50 sets on shipboard, and then there is the United Fruit Co., or the Tropical Radio Telegraph Co., which maintained and operated its own ship sets on about 20 or 25 ships, and also maintained coastal stations at one or two points in the south.

Mr. BURROUGHS. I believe you remarked that there were only seven countries that did not now have government ownership and control of wireless communication. Is that right?

Mr. SARNOFF. This is the number specified by one of the gentlemen testifying on behalf of the Navy Department.

Mr. BURROUGHS. Are you able to state what those seven countries are?

Mr. SARNOFF. The United States, England, Italy, Germany—and what others, Mr. Nally? Do you recall them?

Mr. NALLY. A few smaller nations.

The CHAIRMAN. I will say this, that up to 1913-14 our Government and Austria were the only governments that had legislated on radio communication.

Mr. HUMPHREYS. I would just like to get your ideas on this as a matter of legislative policy. You say to authorize the Navy Department to engage in commercial business, ship-to-shore, not giving them the exclusive right, but simply authorizing them to engage in it, and then appoint a commission such as that suggested by Mr. Nally, and if anybody else wanted to go into this business they would have to go in under such reasonable regulations as the commission made?

Mr. SARNOFF. Yes, sir.

Mr. HUMPHREYS. But you would let the authority of the Navy Department, so far as commercial business is concerned, extend to the ship-to-shore business and nothing more?

Mr. SARNOFF. Nothing more; yes, sir.

Mr. HUMPHREYS. Now, either your suggestion or Mr. Nally's suggestion—I have forgotten which—was to give the Navy exclusive right to engage in commercial business, ship-to-shore, forbidding them to go beyond that. I assume they would have no power to go beyond unless they were authorized to do it.

My question is this: Suppose we simply give them authority to engage in the ship-to-shore business, with permission to supervise generally and regulate the radio business—not exclusively; simply give them authority to engage in that business, and if anybody else wanted to engage in it they could, under such regulations as this commission would make—what would you say about that?

Mr. SARNOFF. Well, the Navy Department at the present time operates and controls more than 100 coastal stations, and is therefore amply equipped to communicate with ships at sea. Having these provisions, and the interference problem still not having been completely solved, but, as I have said, more troublesome in the lower wave-length ranges than they are above, I would consider it more practicable to allow the Navy Department the exclusive field in the case of ship-to-shore communications.

Mr. HUMPHREYS. Suppose Judge Saunders and Judge Hardy, and myself, for instance, had more money than we had good judgment, and we wanted to engage in that enterprise, under regulations prescribed by this commission. Why should we not?

Mr. SARNOFF. I have still reserved for private enterprise overland communication and high-power transoceanic communication; and if Judge Saunders and Judge Hardy would ask my advice, I would tell them to leave the coastal station business alone, to leave it to the Navy Department.

Mr. HUMPHREYS. But they are not going to ask your advice, and they are not going to take it if they ask it—

The CHAIRMAN. Why not show your generosity by inviting them to keep out of the field altogether?

Mr. HUMPHREYS. Now, you and Mr. Nally seem to think this commission can regulate the business efficiently. Of course, everybody agrees there will have to be some regulation. I would like to know upon what theory you proceed when you say we should not be permitted to do ship-to-shore business if we want to?

Mr. SARNOFF. My theory is that at the present time there are enough coastal stations on the Atlantic coast, the Pacific coast, and the Great Lakes, all that are required to efficiently conduct the ship-to-shore business.

Mr. HUMPHREYS. That is your opinion as a business man; I am asking your opinion now as a lawmaker. Of course, as a business man, you naturally would advise us not to embark in the enterprise because you think we would lose money in it. But upon what theory would you write the law that would say we should not do it?

Mr. SARNOFF. I must confess that so far as excluding the private citizen from the business of communication by wireless is concerned, I believe that the law is really not the answer; that invention and

improvement ought to so eliminate this interference problem that as many as desire could engage in this ship-to-shore communication. But dealing with present circumstances, and confining ourselves to the ship-to-shore proposition only, there being so many ships equipped during the war—many, many more than there were equipped prior to the war—the Navy Department already having acquired all these coastal stations, why I think it is the logical thing to leave the ship-to-shore field to them.

Mr. HARDY. You think there would be interference?

Mr. SARNOFF. In the matter of ship-to-shore work there would be interference, in the present state of the art, provided both the commercial companies and the Navy Department were operating on the same wave length; and the Navy Department under the present law has the right to use any wave length it chooses to, and does so.

Mr. HARDY. If Mr. Humphreys and myself got in there we would make mischief?

Mr. HUMPHREYS. We could not make mischief if we had an efficient board to regulate it.

Now, suppose I have an invention, and you do not believe and the Navy Department does not believe that it is a good one, but I do. I go to some capitalist, and he puts up the money. I say, "We will provide sets for all these ships, and we will not charge them anything for it. All we want is commercial business, and our apparatus is so superior to all these others that in a short while we will do all the business." Now, I would like you to give me some theory upon which you predicate your idea that the law should come in and say we shall not do that. I am assuming, of course, that it can be regulated so as not to interfere with the Navy Department and not to interfere with anybody else.

Mr. SARNOFF. In the matter of ship-to-shore communication again?

Mr. HUMPHREYS. Yes; that is what I am alking about now.

Mr. SARNOFF. My knowledge of the practical operating conditions is such that I question very seriously whether interference can be eliminated on the short wave lengths to a degree where anybody and everybody should be permitted to erect a station on shore to communicate with ships at sea. In the matter of the high-power stations it is an entirely different proposition; there you use extremely long waves, and the number of high-power stations that would be erected would be limited to the commercial possibilities. There would not be a multiplicity of high-power stations, because there would not be enough money in it for them.

Mr. HUMPHREYS. Let me state this instance: "In the process of the suns" we all at times reach that state of mind where we are not willing to say that this thing can not be done. Now, this man with this invention that he is satisfied will do the work more efficiently and very much more economically than the Navy is doing it, goes to this **commission that has been established** and convinces the commission by actual experiment, on land we will say, that he has the machine that will do it. They are scientific men, well qualified to pass judgment on that, and in their opinion he has the instrument that will simply put the other man out of business, just as the electric light men put the coal oil lamp out of business. The Navy Department, not under any regulation of this commission but under the law of the *land*, has the exclusive right to do that business. Then what? That

man will have to go to Congress and get a law passed repealing an act that has given the Navy Department this exclusive right.

Now, just why should he be put to that hard necessity, if he can convince the commission that he has got it, and that he has the money and is willing to try it out, because he is not able to convince the Navy Department? The Navy Department will not take it over themselves, and they have the exclusive right under the law. And maybe he would not sell it to them. Why should the law of the land say to that man, "You have got a good thing here, but you just hang your clothes on a hickory limb and don't go near the water"?

Mr. BURROUGHS. "You can not go in, because of a monopoly."

Mr. HUMPHREYS. I would like to hear your theory upon which you predicate your belief that some exclusive power should be given to the Navy under the law?

Mr. SARNOFF. Of course, Mr. Humphreys, in the matter of ship-to-shore communication, we deal with what has been referred to as a matter of safety of life, and I am proceeding on the theory that at the present time there is not any instrument that will eliminate interference in ship-to-shore work and that will make possible two shore stations close together working at the same time on the same wave length without interfering with each other; and further, not on the theory but on the fact that in that particular zone and range of wave length there are more radio stations operating off of the Atlantic coast than there are high-power stations in the world. Therefore, I say leave that field to the Government, now that the Government has all the necessary stations, and thus minimize interference.

However, I am frank to say that if a man comes along with an instrument such as you have described and he can convince the commission that the instrument will eliminate interference and provide for the safety of life regardless of the number of stations working, then and in that event the Navy Department should not have the exclusive monopoly of ship-to-shore communication.

Mr. EDMONDS. The Navy Department would have an advantage over any competitor anyhow, because they could utilize a little greater or a little less wave length, could they not? A commercial concern on ship-to-shore business would have to use the 600-meter wave length, would it not?

Mr. SARNOFF. Yes.

Mr. EDMONDS. And the Navy Department do not have to do that, do they?

Mr. SARNOFF. No; but the ships at sea do.

Mr. EDMONDS. Well, they could have a different apparatus for sending and for receiving, could they not?

Mr. SARNOFF. Under the present law, both stations must use the same wave length. Six hundred meters is also the standard wave length for the distress calls, and under the provisions of the act of 1912 if a man built a commercial station alongside of a naval station the Navy would be prohibited from handling commercial business with ships at sea.

The CHAIRMAN. If Mr. Humphreys' theory is correct, we made a mistake in passing the law of 1912. In other words, he does not believe the Government can interfere at all to regulate anything.

Mr. BURROUGHS. As I understood you, Mr. Sarnoff, you believe this matter of interference can be handled by regulation as well as in any other way?

Mr. SARNOFF. I do; yes, sir.

Mr. BURROUGHS. Then, why the necessity of the Government taking it over, if they had not, as a matter of fact, gone ahead and forced the situation and done it?

Mr. SARNOFF. But the Government has forced the situation and now has the stations, and having all the coastal stations, it seems logical to me that they ought to be permitted to use them.

Mr. GREENE. They may have made a bad trade.

The CHAIRMAN. Is there anything further?

Mr. GREENE. I would like to ask Mr. Sarnoff a question. Now, when the telephone business began, you could hear people talking over another line, and there was a great deal of trouble about it. Nowadays we have lines put together in a cable and twisted and double-twisted, and there is no interference. That has been cured by experience and by invention. Why is it not possible that this interference in radio operation can be cured? Why tie this up so tight, as has been suggested? Why tie this up so close and so tight that you can not get it apart without coming back to Congress? Why not take it in the form of regulation? Then, if the Navy Department has made a trade with the Marconi Co. that was not a good trade, if the Navy got stuck and made a foolish trade, let them bear the brunt of it and not protect them because they made a trade that was not a very good one. They have made lots of mistakes in the last few years, and they are being shown up as they come to light. Why not let them go ahead and make their trade? I do not like to have so much tied up ahead. There is another day coming, a better day, I hope, when there will be more daylight.

Mr. SARNOFF. The Navy Department did not make a bad deal at the price it paid, Mr. Greene. I think they got what they paid for.

Mr. GREENE. In the present light that is possible, but I do not know whether it is a good trade or not. But you would not have completed a trade if you had not both thought you were getting the best of the other fellow. The Government thinks it got a good trade. Why not let it be tested as to whether it is a good trade or not? There is a matter of doubt in the minds of some of us here whether it is a good trade or not. They are not always right. They may construct good vessels and good machinery; but here they are going into a practically new venture. They do not know any more about radio than a good many men in this room know about it. They have had some experience in it, but these other men have had some experience in it, too.

Mr. SARNOFF. I have suggested, Mr. Greene, that the Navy Department be excluded from the commercial operation of high-power stations and also excluded from commercial operation of point-to-point stations; that is, for overland service. I think that in those two fields lie the maximum opportunities for commercial expansion and for commercial profits. I do not think there will be very much opposition on the part of the commercial people to leaving the coastal stations in the hands of the Navy Department, now that they have acquired them through purchase for the use of the ships at sea.

Mr. GREENE. If they do not get too much into this business which *they do not know* anything about, that is all right. I am willing to

let them go ahead so far as they know anything, but I am not willing to get them into the mysteries of commercial business, which they do not know much about and can not do much with.

The CHAIRMAN. Is there anything further? Gov. Griggs will be heard next.

**STATEMENT OF HON. JOHN W. GRIGGS, REPRESENTING THE
MARCONI CO. OF AMERICA.**

Mr. GRIGGS. Mr. Chairman and gentlemen of the committee, I think you must all be conscious that you have done nearly a day's work, and with that consideration in view I will be just as brief as possible and try not to revert very fully to points that have already been discussed.

The declared object of this bill is to take over for the Government, to be administered under the Navy Department, the long-distance stations. The only company in the United States that is prepared for long distance is the Marconi Co., and so, in so far as this bill would have present effect, it would seem to bear most directly and hardest upon the Marconi Co. The Marconi Co. is not only the most important in the way of capital and property and its stockholders, but it is the oldest wireless company in the United States.

When Mr. Marconi had developed the knowledge of the Hertzian waves so as to be able to produce signals and had secured patents in Great Britain and the United States, they formed the Marconi Co. of New Jersey, and Mr. Marconi conveyed to it all the patents and inventions he then had, with an agreement to convey to it all other patents and inventions which the parent company acquired, and I think that is substantially the only agreement on the subject that ever existed between the two companies.

In addition to the patents in that contract the company has put out \$7,000,000 worth of stock, which was paid for in cash. Its present capital is \$10,000,000, and I think its total assets, as figured on its statement, amount to something like \$12,000,000. It has no bonded indebtedness—it has no indebtedness whatever except the week-to-week current bills that it incurs. It has paid two dividends in the course of the 15 or 16 years it has been engaged in business. It has 22,000 stockholders, the most of whom are residents of the United States, who acquired their stock on the hope and expectation that eventually the Marconi Co. would be able to become a successful competitor of the oceanic cables, and thereby would derive a large income which would justify an investor in waiting 10 or 15 or even 20 years for a dividend, because he expected when the result was obtained he would reap largely in returns.

The company out of the \$7,000,000 which it raised in 1908 by an issue of stock of that amount has spent about \$5,000,000 in building stations preparatory to trans-Atlantic, trans-Pacific, transoceanic service. Of course, you can not have transoceanic service unless you have not only a station at this end, but you have to have a coordinating station in the other country. So that whether it is the United States Navy, or whoever it is, that attempts to carry on wireless internationally, they must have somebody to cooperate with at the other end or they can not do it.

The Marconi Co. had in Great Britain the British Marconi Co. to cooperate with, who did agree to put up and who did put up a coordi-

nating station. The Marconi Co. had a contract with the Government of Norway to put up a coordinating station in Norway, and they have put up that station there. The Marconi Co. had an agreement with Japan to put up a coordinating station in Japan, and when the United States was dragged into this war we were carrying on successfully profitable wireless communication with Japan.

And I might stop right here to say that since the United States Navy took over our San Francisco and Hawaiian stations that service has been stopped. It has not been renewed, and to-day it takes seven days to get a cable from the United States to Japan, and we put it through and got an answer back in less than an hour.

I said we spent \$5,000,000 in getting ready to do this international, this transoceanic business. It was from that that the promoters of the company—and when I speak of “promoters” I mean not in the sense of those who sold the stock, because we did not have any such promotion, but I mean those who were proceeding with the business and development of the company. It was their expectation that the great profit of the company would come from this long-distance service, and what we expected was that we would so cut into the rates charged by the cable companies that we would acquire a very large part of the business; and not only that but that we could take certain messages that were called “deferred” messages at rates which the cable companies could not afford to transmit.

Well, just when we were ready to inaugurate this service with the British Islands, Great Britain went into the war, and, of course, they had to take over the stations, and our stations have been idle ever since. I am speaking only of our long-distance stations—they have been idle ever since, so far as the Marconi Co. has been concerned, although I understand the Navy Department has operated one or more of them to some extent.

That being the situation, and the war being—well, under armistice, but practically over, and the methods of peace about to be resumed throughout the world, as we hope, in comes the military arm of the Government, the Navy Department of the United States, and asks power of Congress to take away from the Marconi Co. not only these stations but all of this prospective business that it has been planning and working and spending money for 20 years to develop and build up. Just when the farmer has planted his seed, plowed his field, and harrowed it, and cultivated his crop, and the corn is ready to husk, the Government comes in and says, “We want that crop.”

Well, there must be some justification for such action as this. It is unusual; it is severe. The requisitioning of the property devoted to the uses of commerce or manufacture by citizens of America, the requisitioning of that property is harsh, unusual in time of peace, and ought not to be permitted by Congress except on grounds of public necessity. You can not take ground for a railroad under the laws of condemnation of any State in the Union, unless it is necessary. You can not take the right to string telegraph or telephone poles unless it is necessary for the purposes I have named.

Now, is it necessary that the Navy Department should have control of the commercial long-distance communication of the United States? It strikes one as peculiar that when a request is made of the Congress to turn over the commercial traffic in wireless that request should be to put the power in the least qualified, from a busi-

ness point of view, department of the Government. I should say, I should expect normally and logically, that if the proposition were made by anybody that the Government ought to control long-distance service, they would expect not the Navy Department but the Department of Commerce to control it. It would seem to me that the theory of the formation of these departments of the Government would put in the Department of Commerce the oversight and the conduct of commercial business to be done by the Government. And it is quite anomolous, and I might say it is startling, to have the military branch of the Government come here and say, "We must conduct commerce."

Well, now, what necessity, what reason do they give? The reasons are not harmonious and they are not consistent. Nearly two years ago, before this same committee, there was a bill providing for the Navy Department taking over the wireless system. The reasons for it were given by various gentlemen connected with the department and others, including the Secretary of War. The Secretary of War—I refer to page 12 of the record of the hearings two years ago—says:

It would be a very harsh thing to do, to wait for war to break out and then take over the commercial stations; it would be a very harsh thing to interfere with private interests.

The Secretary of War recognized then that it was a harsh thing to do in time of war. He had a feeling of compassion for the company.

But Commander Todd—I do not know, but I hope he has been promoted since and is captain now—but Commander Todd said then, on page 30:

But we can not take them over to advantage—

Meaning the stations—

when war is imminent; it is too late.

And, to the same effect, Capt. Bullard, who had been in charge of the aero department of the Navy, said, on page 78:

Now, we hear considerable about the proposition in regard to these commercial stations, that the Government is in a position to take them over in time of war; but it must be remembered that in time of war, however we deplore it, we do not get all the notice in the world we want; we do not get three or four weeks' notice or we do not get three or four months' notice. It comes on us overnight. And we want to be prepared.

So that the reason at that time was that in case of war they wanted to be prepared beforehand. Now all that reasoning and all that argument is absolutely dissipated by the experience of the Navy Department in this war, which came after that hearing, because they have said, with the fullest justice to the wireless companies, that they most patriotically turned over their apparatus, their stations, their force, their everything to the Government, and that everything ran as smoothly as could be; in fact, they take certain justifiable pride—the Navy Department does—in the way they conducted the wireless during the time the war was raging; and we agree that the Government suffered no harm from the fact that that bill did not pass in 1917, the fact that they had no power to take the stations until actual war was going on did not disturb the public safety in the slightest degree.

All the reasons they gave then to endeavor to persuade this committee to give them this harsh power that Secretary Baker spoke of, all the reasons they gave then have absolutely vanished, yet here they are back again with a bill a good deal more extensive than the one they had then, and they have found a new reason for interfering with the natural forces of commerce, and the new reason for interference is the reason of "interference."

I am not going to deal with that technical feature that for the Marconi Co. to be carrying on its business, its commercial communication with Great Britain and with Norway, and with Pan-American countries, with South America—I am not going to deal with the question as to whether that is going to interfere with the Navy operations of their stations in time of peace. You have heard all there is about it. But I want to call your attention to this, gentlemen: In time of peace the interests of commerce and business are superior to all the navies of the earth. This country does not exist for the benefit of the Navy. The Navy Department exists for the benefit of this country, and no interests of this country should be subordinated to the control of the Navy Department merely because they want it, and substantially that is the only reason that is behind this bill so far as these officers of the aero bureau of the department are concerned.

Let me ask you this, What law compels the Navy Department to transmit official business or press messages by these stations if they take them over? And if they are willing to transmit messages, if they find that the needs of communication in time of peace, when battleships will lie rusting in harbors—if they find that the needs of their service will still permit some business to be carried on, how will they carry it on? We have had a censorship for the last year and a half. No man could send a message by cable unless it passed a Government censor. No newspaper could get a communication from the front unless it was such as the censor permitted to come over the wires. Do you want to perpetuate a censorship in the Navy Department? If, then, the power, the only power, to operate transoceanic stations is the Navy Department, what newspaper, what correspondent, what business house but what would be at the mercy of some lieutenant commander who had a prejudice against the paper or the correspondent or the business house and did not like it, and who would not take their messages unless they conformed to his ideas of what was proper news to send across? Is there anything to hinder that? The interests of the Navy Department could always be cited as the reason why particular news should not come. I do not hesitate to say that I can conceive of no emergency in time of peace connected with the maintenance and operations of the American Navy or naval stations which would require that they should have first control of long-distance wireless. I say the first use belongs to business and commerce; it belongs to the business people, to the press people, to the commercial people of the United States, and it does not belong to the officers of the Navy Department.

Of course, gentlemen, I understand that there are some people who think the Government should control all these utilities for the purpose of preventing monopoly, and for other reasons. I do not want to enter in a discussion of that, but I do want to point out that it was *immediately* after the Navy Department had forced the Marconi Co.

into an agreement to sell their ship-to-shore stations that this bill asking for more power came in, and that after this bill got here the cable companies were requisitioned by the Government, after the armistice had been signed; and that there is pending, in the House of Representatives, a bill or a joint resolution to have the Government take over the cable companies and administer them through the Post Office Department, in which connection I wish to call to your mind the fact that the present Postmaster General addressed a letter to Judge Alexander, the chairman of his committee, on January 15, 1917, in advocacy of the policy of taking over the wireless stations for the Government, and he said, quoting from page 96 of the record of that year:

There is no essential difference in principle between communication by radio and communication by telegraph or telephone.

There it is, stripped bare. To the mind of the Postmaster General they both come under the same head.

The fundamental principle—

He said—

involved in all means of electrical communication is the transmission of intelligence, and this is distinctly a postal function, and there is no logical or consistent reasoning that will sustain a proposition to place the licensing of stations and the fixing of rates, etc., for one means of electrical communication, in another department, while jurisdiction to some extent over other means of electrical communication is already lodged with the Post Office Department.

And he wants the bill amended so as to have control of wireless stations in the Post Office Department.

I do not know whose handiwork this bill is, but certainly it is a most inadequate—and, I might say, most inartistic bill. We can pass over the omissions and contradictions contained in the bill, and get a little insight into the state of mind of the department in connection with the taking over of our stations.

It provides in this section 8:

That when any radio station is requisitioned, taken possession of temporarily or permanently, or closed, or its license revoked or suspended, the United States shall pay to the persons interested therein just compensation for the property or interest so taken, provided that a claim for such compensation is made on the Secretary of the Navy within two years after the date of the passage of this act.

Of course, as was pointed out in the last hearing, if the station was taken over three years from now there would not be any way of getting compensation. But that was a mere slip of the pen.

In case of disagreement as to such just compensation, the Secretary of the Navy shall make an offer, and if such offer is not accepted there shall immediately be paid to the person interested three-quarters of the amount offered.

And then the person interested can go to the Court of Claims and have a law suit for the rest.

Passing over the obviously unjust, unfair, and arbitrary methods of dealing with the person whose property is thus taken, I want to call your attention to the fact that that does not provide at all for just compensation. Just compensation is what the Government owes for the property taken.

If you have a company like the Marconi Co., that has been 20 years elaborating, improving, expanding, building up to a certain point of perfection, and then the Government comes in and takes

that merely at its scrap-rate value, or its value as it stands, and does not take it at its value as a going company, nor take into account what it is capable of earning, nor take into account the money that has been spent working it up, scrapping of machinery and apparatus, and has taken all these 20 years—you see how much encouragement you are giving people to invest their money in enterprises of this kind, and you see how unjust it is to these stockholders, who have been willing to wait 5, 10, or 15 years until the company could do this business and earn dividends, to buy them out for the scrap value of their stations.

Two years ago Commander Todd said significantly that he thought these stations could be got for \$5,000,000, and if we waited five years they would be worth \$20,000,000. There was evidence that Commander Todd knew when those stations were put in operation the large business that we expect was coming to them and the profits that were earned by the company, property which represented merely on the ground \$5,000,000 as a going concern would be worth \$20,000,000. I do not tie myself to any figures, but you know the difference between the preparation to do business and the doing of business.

Let us see what it is that they propose thus to take in this arbitrary way. They propose to take the Marconi system in the United States. Well, what is the Marconi system and who is Marconi? I would like to read to you a judicial statement made in 1905 by Judge Townsend, of the United States Circuit Court for the Southern Division of New York, in a patent suit. I read from One hundred and thirty-eighth Federal Reporter, page 673:

The exact contribution of Marconi to the art of spark telegraphy may be stated as follows: Maxwell and Crookes promulgated the theory of electrical oscillations by means of disrupted discharge. Hertz produced these oscillations and described their characteristics. Lodge and Popoff devised apparatus limited to lecture or local experiments or to such impracticable purposes as observation of thunderstorms. Marconi discovered the possibility of making these disclosures available by transforming these oscillations into definite signals, and, availing himself of the means then attained, combined the abandoned and laboratory apparatus and, by successive experiments, recognized and developed them into a complete system, capable of commercially utilizing his discoveries.

Marconi has been recognized by almost all the great scientific societies of the world as the real inventor and discoverer of the practical art. He has had conferred upon him the Nobel prize. The Governments of Great Britain, of France, of Spain, of Belgium, of Russia, of Italy have honored him by reason of that invention. The only two great commercial countries that have persistently refused, so far as their governments are concerned, to recognize Marconi or his patents are the United States and Germany.

When this company first began its operation of ship-to-shore business we got permission to put a station on the Scotland Lightship, at New York Harbor, equipped with Marconi apparatus. The Telefunken, a German company, in which the Emperor of Germany is said to have been a stockholder, equipped a German ship with Slaby-Arco apparatus, and when it came along it attempted to communicate with the Scotland Lightship and the Scotland Lightship refused to communicate with them because they had not the Marconi apparatus. The ship reported the thing to the home government at Berlin. Immediately the Kaiser sent word, through the German Ambassador, demanding some kind of satisfaction for the outrage, and immedi-

ately, in compliance with his demand, the Marconi Co. was ordered to take its apparatus off the Scotland Lightship—and it did.

Let us see what the attitude of this department has been toward the Marconi Co.

The CHAIRMAN (interposing). When did that occur, Gen. Griggs?

Mr. GRIGGS. I beg your pardon.

The CHAIRMAN. When did that occur? It is interesting history.

Mr. GRIGGS. Well, I can only tell you according to our old Latin way—the way they used to do it in Roman times—“Roosevelt being President.” [Laughter.] I should say it must have been about 1904; but I am not certain about that. I think we have the communication on file yet.

Let us see what the attitude of the Navy Department has been toward the Marconi Co. and generally toward all inventors and patentees—because you must bear in mind when you think of monopolies in connection with business—that a large part of the property of the Marconi Co. consists in lawful monopoly, conferred upon it by the United States Patent Office under the law. Its patents are supposed to be monopolies, and they are given monopolies as incentives to reward invention and discovery; and in that respect we are proud of our monopoly.

Very early—as early as 1904—the Navy Department began equipping naval vessels with piratical apparatus purchased from companies that made apparatus and sold it embodying the Marconi patents. The Marconi Co. protested to the Navy Department against that practice, and said it was not fair to a patentee to have the United States Government, which granted the patent, accept goods and buy them from a pirate. It was replied by the Admiral, who at that time had charge of the bureau, that the Navy Department took no cognizance of patent rights, except so far as they had been adjudicated by some court. Whereupon the Marconi Co. brought a suit—which I referred to—against the De Forest Wireless Co., and the Marconi patents were sustained as valid, and the De Forest Co. was enjoined, and there was a complete judicial determination of the validity of the Marconi patents by Judge Townsend, who was a very able judge.

Whereupon we meandered again down to the Navy Department and saw the admiral and said to him: “Sir, we have brought suit against an infringer, and the Circuit Court of the Southern District of New York has declared our patent valid, and we now ask you to cease buying apparatus from these infringers.” And the admiral said: “We can not recognize the decision of a subordinate court. We must have a decision of an appellate court.” “Ah, but,” we said, “De Forest will not appeal. He acquiesces in the decision.” To which Admiral Manning replies, “Well, that is your misfortune.”

The Navy Department proceeded from that time to this, against our protest, ordering apparatus that embodied the patents of the Marconi Co., which had been adjudicated, and some of them subsequently adjudicated—some other patents—by the Circuit Court of Appeals. They went right on, in spite of decisions, and protests, and everything, ordering apparatus from piratical contractors.

Mr. HARDY. Just pardon me one moment.

Mr. GRIGGS. Yes, sir.

Mr. HARDY. Did you try to enjoin these other parties from making or selling this apparatus?

Mr. GRIGGS. Yes, sir; we brought a suit in New York in the Federal court against a man by the name of Simon, to enjoin him; and the Assistant Secretary of the Navy sent a private letter to Judge Hough of the court—this was before war; it was not during the war—saying that if Simon could not be allowed to go on and fill his contract with this pirated apparatus—he did not say “pirated,” I am putting that in—it would be injurious to the interests of the Government. Whereupon the judge dismissed our suit. We took an appeal to the United States Supreme Court, and the Supreme Court held he was wrong and reversed him and remanded the suit back to be tried; and then when we had prepared to try the suit again, the war having intervened, the Navy Department asked all the Federal courts not to try any patent suits—to stop trying that suit against Simon. They directed the Marconi Co. to stop bringing on an appeal in the Circuit Court of Appeals for the Ninth Circuit that was set for argument in San Francisco, in which the Government was not a party and was not interested at all; and because the Marconi Co. did not come right down and agree to do it, but rather protested against the injustice, they telegraphed to the court and asked the court not to hear it. The Marconi Co.—

Mr. HARDY (interposing). That was during the war?

Mr. GRIGGS. That was during the war.

Mr. GOODWIN. Who was it sent that telegram?

Mr. GRIGGS. The Assistant Secretary of the Navy, Mr. Roosevelt, so I am informed by counsel in the case who was out there at the time. Of course, I have never seen the telegram. We had a decree against another De Forest Co.—because as fast as you beat one of them by an injunction and order to pay costs they went bankrupt, and then they made up another company and started again—before Judge Mayer for an injunction and accounting, and that was affirmed by the Circuit Court of Appeals, and we wanted to go on with the accounting and the Government would not let us.

Well, several years ago, having got no relief whatever from this treatment by the Navy Department, we began suit against the Government in the Court of Claims to recover royalties for the apparatus which they had bought from pirates, the claims arising under the adjudicated patents; and what do you think the Government did? They not only denied our right to any royalty, but they denied the validity of the patents and required us again in the Court of Claims to go through another trial as to validity of patents which had been passed on by the Circuit Court of Appeals, although applications for certiorari to the Supreme Court were refused.

Mr. BANKHEAD. When was that litigation instituted in the Court of Claims?

Mr. GRIGGS. In 1916.

Mr. BANKHEAD. That has not been decided?

Mr. GRIGGS. Has not been decided. We examined one witness, and the Government's counsel adjourned for cross-examination, and he has never been willing to cross-examine him yet; and only yesterday, gentlemen, the clerk of the court sent word to our attorney to appear in court and show cause why the case should not be struck from the calendar because the case had not gone on, and the Government attorney had to get up and admit it was his fault.

Mr. GREENE. I should like to suggest that we were assured when we had the hearing before that while they would not make any arrangement to pay anything, you could go to the Court of Claims.

Mr. GRIGGS. Oh, yes. Well, there are a good many inventions which do not belong to the Marconi Co. which are used in wireless apparatus, but the department went on treating them all alike, and during the war there was perhaps some justification for the Navy Department's saying, "We can not stop to adjudicate patents now," provided that had not been a continuance of the practice maintained for 15 years constantly.

The thing went on until it seems Commander Hooper was the first who had a pricking sense of honor and justice sufficient to induce him to do something in the way of remuneration to the people whose patents had been nullified by the Navy Department, and he told you something about what was going to be done. I do not want to take any credit away from Commander Hooper, not any credit he is entitled to or that he claims, but I happen to know something about how that came about. It came about this way: The War Department applied to the Marconi Co. for apparatus, and we asked, "What about patents?" and they sent Capt. Young to see us—an Army officer who had been a patent lawyer—and he brought with him an opinion from the Judge Advocate General of the Army saying that it ought to be the policy of the War Department, where patents had been adjudicated, to recognize the right of the patentee and not to use the patents except on settlements for the royalty. Capt. Young came and wanted to make an arrangement for royalties for the War Department for whatever they bought of others which embodied our patents.

And then, in connection with that, it went on so that we suggested to Capt. Young that the War Department ought to develop that idea until all the claims of patentees for infringement against the Government or any of the departments were settled up at one lump and all this disgraceful situation put an end to; and it was through Capt. Young that this commission was initiated and formed, if I am correctly told, and I hope that something good will come of it, because we have evidence, gentlemen, we have very strong evidence that the policy of the Navy Department has very materially changed within the last six months; because it is on record in this hearing that whereas they would never recognize any patent that had not been adjudicated and they would not recognize any adjudicated patent that had not been confirmed on appeal, and then they would not recognize any patent whatever—they bought a patent or a bunch of patents that had never been adjudicated for \$1,600,000. [Laughter.]

Mr. GREENE. Tell us the whole story.

Mr. GRIGGS. Now, one or two words with reference to the Pan American Co. and its status under this bill if it should pass.

That company has not any stations, and this bill refers to the taking over of stations. But that company is forbidden to do business under this bill.

Who is going to recompense them? That company was encouraged by the State Department of your Government; it was encouraged by the Navy Department, or the officers of the Navy Department of your Government. Over \$100,000 has been expended. We have

pledged our good faith to the Government of Argentina that we will build that station down there, and they expect us to do it, and yet this bill is going to wipe that thing out and not make one dollar of recompense to the stockholders of the Pan American Co.

Do you gentlemen agree to that kind of a policy? What kind of a spirit does this bill show? What does a bill drawn with such imperfect comprehension of the principles of just compensation indicate as to the minds of the men that are backing it up? Does it indicate a desire for arbitrary power? Does it indicate that the military spirit is back of it and not the spirit of justice and peace?

Mr. HARDY. Gov. Griggs, I do not understand what that particular case is that you refer to now—the Pan American case?

Mr. GRIGGS. It has been explained; perhaps you were not here at the time, Judge Hardy.

Mr. HARDY. Perhaps I was not.

Mr. GRIGGS. It has been explained that a company has been formed, officered entirely by Americans, to build communicating stations between the United States and South America, and Mr. Nally told the committee how he had gone to the Argentine Republic and had secured the extension of a concession from the Argentine Government which we had bought, and that we had purchased a site for a station; and, whether Mr. Nally stated it or not, I do not know, but we were about to establish a site for a station and enter into a contract—which was drawn—for the construction of a station in this country at an expense of probably \$2,500,000.

Mr. HARDY. A station in this country and one down there in Argentina?

Mr. GRIGGS. Yes; a station here and one down there. And after that had been done, with the knowledge, approval, and encouragement of the Navy Department, or, at least, of the officers of the Radio Bureau and of the State Department, we were notified by the Secretary of the Navy that he was now opposed to the scheme; and in prudence we had to stop spending money on that scheme, and there is no station built.

Now, this bill, if it passes, will make everything that was done by that company void; it ends its rights; it forbids it to go on with this enterprise; and all this money is forfeited; and there is no provision whatever for recompense.

Mr. HARDY. I see your point now.

Mr. GRIGGS. You see the point, do you not? There is no provision for recompense in this case, because the bill only provides for taking over stations.

Now, is any gentleman on this committee willing to perpetrate an injustice like that on a company that, while it is trying to make money for its stockholders, is certainly trying to do something big and good for the commercial and business interests of the United States?

Then something was said about the policy of having stations in South America; for instance, controlled by this Government or by private companies. Now, here is a point about that that I may refer to:

If in time of war in which the United States or the Argentine is a neutral a private company is allowed to carry on communication *with a belligerent country*, it is not a breach of neutrality on the part

of the country. But if a Government station in Argentina or in the United States carries on communication with a belligerent Government, it is a breach of neutrality under international law.

I might point out that one reason why the ship-to-shore business in the United States has been so limited is probably due to the shipping laws of the United States, in which connection it has occurred to me that gentlemen who talk about freedom of the seas as a policy of the United States have entirely forgotten that no foreign bottom can do business under the coastwise shipping laws; no foreign ship can trade between the United States and Hawaii, or the Panama Canal, or the Philippine Islands, or any of the possessions of the United States, and perhaps the wireless would be better, and our standing as advocates of the freedom of the seas would be better if we let up a little on our shipping laws and our coasting laws.

Mr. Chairman, that is about all I have to say, except this:

I suppose that you gentlemen would never think of reporting as barren and as naked a bill as this, even if you were in favor of the Navy's taking over these things, which I would suppose you would not be in view of the imminent discussion of this whole subject that is liable to occur before this time next year.

But if you should—which I hope you will not—think that the Navy Department ought to run the commercial business of the United States to this extent, then I submit that it is only just that you should amend the bill in this way: Put in at the end of the eighth section in the section relating to "just compensation" something like this:

"When any radio station, stations, or system of stations of any wireless company shall be permanently requisitioned or taken over by the United States the just compensation to be paid to such company shall include the value of the services, expenses, work, and labor done and expended in the development, elaboration, and preparation of said company for the transaction of wireless communication on a commercial basis, and shall include the value of the good will and patents of the company, so far as such patents are or may be valuable for use in such stations for transoceanic commercial communication, to the end that such company shall not be deprived without compensation of the prospective profits that would accrue to it if it were permitted to continue in the operation of wireless communication with transoceanic countries. The mere value of the physical properties of the company shall not be the measure of compensation. In case of disagreement between the United States and any owner of a station or stations so requisitioned as to the amount of compensation that shall be paid by the United States such amount shall be determined by arbitrators. The United States and the company shall each name one arbitrator; if these two can not agree they shall choose a third person as umpire, and the amount fixed by any two of such arbitrators shall be the amount to be paid by the United States to the company as just compensation. The fees and expenses of the arbitrators shall be paid by the United States upon the approval of the Secretary of the Navy."

Now, it does seem to me that, in view of all the business that the Court of Claims is going to have consequent upon this war the methods by which disputes as to the value of property are ordinarily determined ought to be adopted by this Government; and whether

you ever use that amendment or not in this case I think I am doing a service to you gentlemen of Congress in calling your attention to the fact that the Court of Claims no longer stands, in a strict sense, as a court of justice wherein justice is judicially administered, because it is not administered there as promptly as it ought to be.

The CHAIRMAN. I would like to refer to one matter in connection with section 8, as written in the bill:

That is substantially the form in which some provision has been written into other bills reported out of this committee, which have since become law, especially with reference to the condemnation of property for housing, facilities for docking, and other purposes. Now, it is our view, and I think the view of Congress, that we should not undertake to limit what just compensation is by statute.

The Constitution, of course, provides that private property may not be taken for public use, except upon just compensation. And even if the bill were enacted into law as written, the courts, in determining what would be just compensation to the Marconi Co. for its properties, would not simply include the physical property, but also the good will and the value of the property as a going concern; in other words, all the elements, substantially, which you set out in detail in your proposed amendment.

Mr. GRIGGS. Do I understand, Mr. Chairman, that you would so interpret this section 8 of the bill as it now stands?

The CHAIRMAN. Well, I say that just compensation, under the Constitution, would include all of those things.

Mr. GRIGGS. Compensation for what?

The CHAIRMAN. For the property.

Mr. GRIGGS. It says for the station.

The CHAIRMAN. No; it says "property." It reads this way:

That when any radio station is requisitioned, taken possession of temporarily or permanently, or closed, or its license revoked or suspended, the United States shall pay to the persons interested therein just compensation for the property or interests so taken, provided that a claim for such compensation is made on the Secretary of the Navy, etc.

Now, do you think the courts might construe that to refer to the individual station?

Mr. GRIGGS. Yes; to the station and the apparatus and the ground.

The CHAIRMAN. Without reference to its value as a part of a great system?

Mr. GRIGGS. That is what I mean.

The CHAIRMAN. Well, if you do mean that, and the courts take that narrow a view, I agree with you that we ought to modify that language.

Mr. GRIGGS. You would not construe it in that way. The fact is that the Marconi Co. could not get anything for its good will or get anything for its patents or get anything for its labor.

The CHAIRMAN. Well, I would say that that would be unconstitutional, if that were the construction by the courts.

Mr. GRIGGS. How could you say that when Congress has the right to take a business without compensation, just as it did in prohibiting the breweries from using their property without any just compensation to them?

The CHAIRMAN. Well, that depends upon a different principle; the courts have never recognized the right of a brewery or a distillery to

sell its products; in other words, those people had no vested rights to the manufacture and sale of intoxicating liquors. But I see your point.

Mr. GRIGGS. I will leave this proposed amendment with the committee.

Mr. HUMPHREYS. I would like to ask you as to a question of policy you have already discussed here in Mr. Nally's statement. What do you think of the policy? I just want your opinion on that.

Mr. GRIGGS. What policy?

Mr. HUMPHREYS. I am going to ask the question now.

Mr. GRIGGS. I beg your pardon.

Mr. HUMPHREYS. The policy of giving the Navy the exclusive right under the law to do ship-to-shore business.

Mr. GRIGGS. I do not think it is good policy myself.

Mr. HUMPHREYS. Well, what do you think of this proposition, submitted by Mr. Nally, of creating a national commission to regulate the radio business generally and to—

Mr. GRIGGS (interposing). I approve of that. I will say this, that if you could get Capt. Todd, of the Navy Department, Mr. Chamberlin, the Commissioner of Navigation, and two practical wireless men, they could sit down and determine all these questions just about as fairly as could possibly be done, without injustice to anybody.

Mr. HUMPHREYS. Do you think the Navy Department ought to be permitted to do commercial business—ship-to-shore business?

Mr. GRIGGS. I do not. Now, that is my sentiment, you understand.

Mr. HUMPHREYS. I understand; I just want your opinion.

Mr. GRIGGS. My sentiment is that no military department ought to be allowed to do business.

Mr. ROWE. Commercial business?

Mr. GRIGGS. Commercial business, I mean.

Mr. GREENE. I have argued against it, because I do not believe they can do it successfully.

Mr. HUMPHREYS. Well, as a consequence, you do not believe, of course, that they ought to be permitted to do this long-distance business?

Mr. GRIGGS. Certainly not. The nature of a military man, whether of the Navy or of the Army, is to put the interests of his department above all other things; that is what the military education produces.

Mr. GREENE. That is the result of his training.

Mr. GRIGGS. Yes; and it is to his credit during war time; that is what we have him for. But in time of peace he is not the man to conduct the affairs of peace.

The CHAIRMAN. Are there any further questions?

Mr. EDMONDS. This \$1,450,000 that you have got for the shore stations must have included something besides the value of the shore stations, did it not?

Mr. GRIGGS. Yes; it included three hundred and odd sets of apparatus on the ships, each one of which had cost us about \$3,300.

Mr. EDMONDS. Your shore stations last year were estimated by the Navy Department to be worth about \$400,000. What made them go up so much in value?

Mr. GRIGGS. The Navy Department made that estimate?

Mr. EDMONDS. Yes.

Mr. GRIGGS. I do not know what their estimate was based on, but you must bear in mind that, when they took over these sets of apparatus, 300 of them, they took over our prospective income out of the contracts we had—

Mr. EDMONDS (interposing). Then they did make a settlement with you, based on some prospective value outside of the real value of the property?

Mr. GRIGGS. I think so. I did not negotiate the details of that at all.

Mr. BANKHEAD. What is your official connection with the Marconi Co.?

Mr. GRIGGS. I am president and general counsel of the company.

The CHAIRMAN. Are there any further questions, gentlemen?

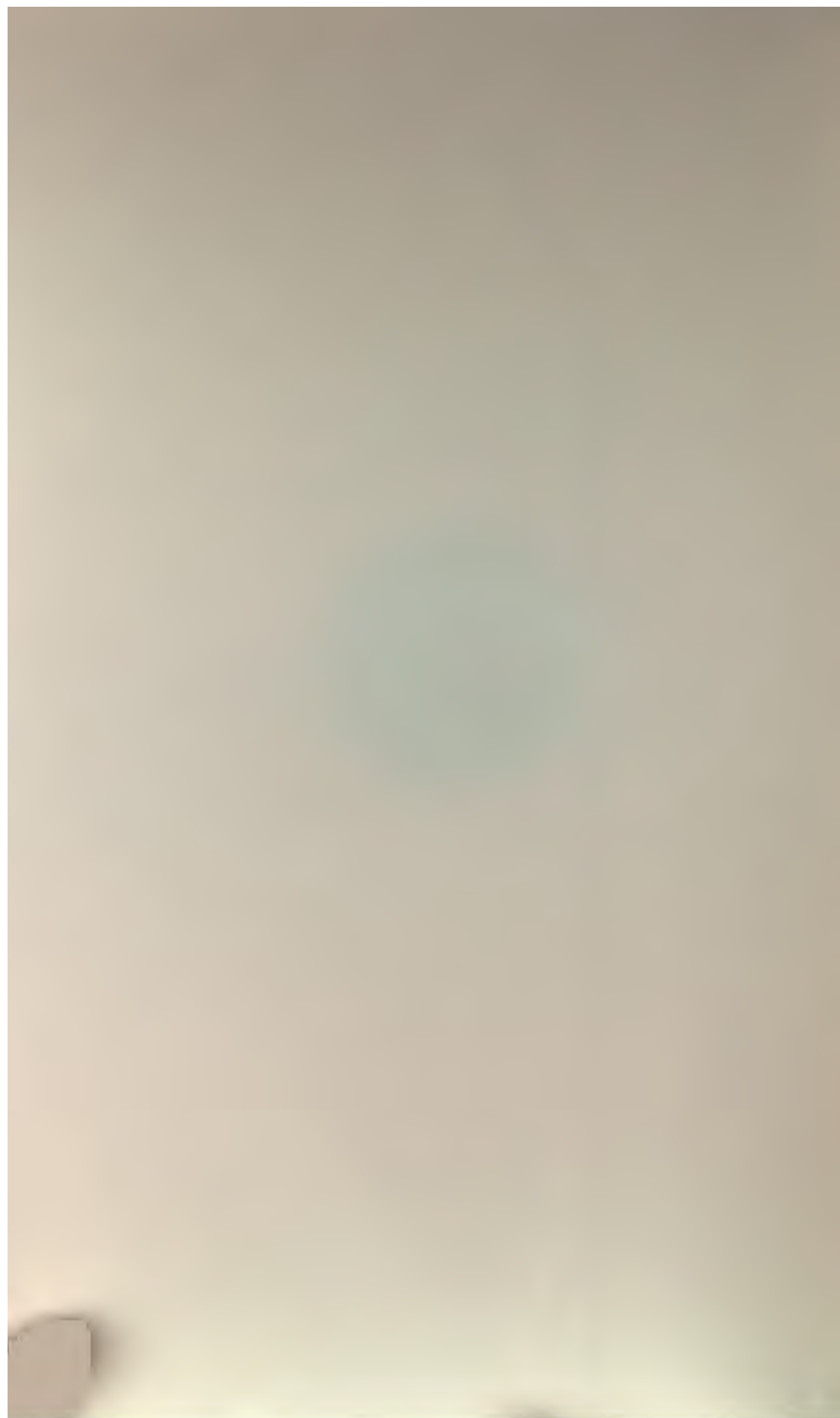
If not we will adjourn until to-morrow morning at 10 o'clock. The hearing will begin then and I will be glad if every member of the committee will be present.

(Whereupon, at 5 o'clock p. m., the committee adjourned until Wednesday, December 18, 1918, at 10 o'clock a. m.)









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